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Hunc Librum cui Titulus *Tractatus de Foetu Nutrito* dignum judicamus qui

I M P R I M A T U R,

GULIELMUS DAWES,

Præses.

GUALT. HARRIS,
JOH. BATEMAN,
JOH. WOODWARD,
GIDEON HARVEY,

} Censores.

Datum ex Collegio No-
stro vicesimo secundo
Octob. Anno 1714.

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Tractatus de Foetu Nutrito:

O R, A

DISCOURSE

Concerning the

NUTRITION

O F T H E

Foetus *in the* Womb,

Demonstrated to be by ways hitherto
unknown.

In which is likewise Discover'd the Use of the

GLAND *THYMUS*,

WITH AN

A P P E N D I X:

Being some PRACTICAL ANIMADVERSIONS
on the Food of Children newly Born, and
the Management of the Milk of Women.

Ardua prima via est. Ovid.

By *F. BELLINGER*, of the
College of Physicians.

L O N D O N :

Printed for *W. INNYS* at the *Prince's Arms*
in *St. Paul's Church-Yard*. 1717.



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Walter Hanning M.D.

Dec. 1855

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TO THE
RIGHT HONOURABLE
JOHN,
Lord GOWER.

MY LORD,



THE Liberty I here presume to take in laying this poor Treatise at Your Lordship's Feet, cannot arise from any Merit either in the thing it self, or its obscure Author: No, My Lord, it is not possible for either to attain to any Pretensions of that kind: 'Tis merely and entirely

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Epistle Dedicatory.

Petitionary in the plainest and most humble Terms, to beg Your Lordship's Patronage and Protection to both, from the Insults of Prejudice and Envy, to which all Attempts towards new Discoveries of this kind are continually expos'd.

And what greater Encouragement can I have, than to contemplate on that Inherent Goodness, that Hereditary Condescension, and Extensive Charity, devolv'd on Your Lordship from Your great Father, which require no Arguments to persuade, when the Objects of those Divine Virtues are but laid before Your Lordship: And this is all I can produce, either as Reason, or Excuse, for this present bold Address.

Upon the mentioning only of the late Lord *Gower's* Name, how naturally do our Thoughts run back to the Observations which were made in the two late Reigns, when from common and daily Conversation it was impossible but to collect, that all who wish'd
well

Epistle Dedicatory.

well to the Establishment either in Church or State, express'd their Satisfaction, and even accounted for their Security, according to the share that great Man bore in the Ministerial Administration. And for those Reasons alone it was that Her late Majesty of most belov'd and ever blessed Memory, distinguish'd him by her Favour in Places of Trust, and Titles of Honour, to which his Lordship, as he had an uncontested Merit, so was he a far greater Ornament to them, than they could be to him; and it is well remember'd, how great a confidence Her Majesty repos'd in all his Counsels. And now, my Lord, whatever may be the business of other Dedications, it is, in respect to Your Lordship, no more than common Story and Relation to say, that nothing could alleviate that National Loss; but that we see the unblemish'd Virtues and Honours of my Lord *Gower* transmitted to Your Lordship, without any Diminution or

Epistle Dedicatory.

Alloy. Our holy Religion, and our Civil Rights, being thus well assur'd of a fast and an unalterable Friend, (whatever Difficulties may appear) as Your Lordship is a Stranger to Fear, above a Biais, and a ready and vigorous Assertor of the Liberties of *England*.

It is still some farther Addition to our Pleasures to see Your Lordship's Family encreasing, that our Posterity may have the Happiness of that Influence under which we repose our selves with an inexpressible and resign'd Satisfaction. And indeed what may we not promise our selves and them from the happily combin'd Issue of the *Levisons* and the *Pierpoints*.

Deus est in utroq; Parente.

May Heaven shower down its most benign Influence on those early, those noble Seeds, and bring them to Perfection in Your Lordship's Days.

My

Epistle Dedicatory.

My Lord, as to the ensuing Performance, it being upon a Subject the most common in Nature; namely, the Propagation of all Animal Productions in their several Species, so far as it relates to their first nutrimental Office and Communication, and yet (notwithstanding the many excellent Anatomical Discourses made Publick) not sufficiently evidenc'd to the World. It is, I do confess, a very adventurous undertaking; and had not my Thoughts on the Subject met with that general as well as particular Approbation with which they are honour'd, I freely confess they had never seen the Light; nor could I otherwise have had the Confidence to have inscrib'd these Papers to Your Lordship. But as my Superiors have been pleas'd to legitimate them, and Your Lordship's Family have ever been the Patrons and Favourers of Learning on the Attempts that way, I again implore Your Lordship to protect them. Yet after all, I beg leave
solemnly

Epistle Dedicatory.

solemnly to declare, that the desir'd and most acceptable part to my self is, that upon that Encouragement and Authority I have presum'd to affix Your Lordship's Name at the Head of this so plain a Discourse, that it gives me an Opportunity of paying my humblest Duty to Your Lordship, and of honouring my self in subscribing,

MY LORD,

Your Lordship's

most Devoted,

most Humble, and

most Obedient Servant,

FR. BELLINGER.

T H E



T H E
P R E F A C E.



O know a Man's self, was look'd upon by the wise Philosopher, to be so excellent a Rule and Direction through all the varieties of Life, that he concluded it of divine Extraction, that it descended from Heaven, and must be the Voice of an Oracle, and a God; in as much as he thought it impossible for Man to give so much Energy, Force, and Significancy, to so few Words, or to form a Law so perfect and extensive in so small a compass. Were Men well acquainted and convinced of the Dignity of their Being on one side, and the Insufficiency of their Capacity

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Capacity on the other, and would but act according to such Convictions, and the Standard of natural Conscience; so much Vice and Folly could never be in the World: But we are either Strangers to, or we forget our selves; and when through our own Folly and Heedlessness, Rashness or Neglect, we are embarrass'd in inextricable and irremediable Misfortunes, we fall foul on all about us, and lay the Blame on any thing but the true Cause. To instance in a particular or two, and to speak in a speculative and paraphrastick manner before we name the Vice: Can we, upon serious thinking, imagine, that any one of the Species call'd Human, should voluntarily descend from his Station, and place himself below the Character and Figure of any thing that's call'd brutish, to give away his Understanding, to resign his Health, his Senses, and his Strength, and surrender them at Discretion to the Conduct of every Knave or Fool; to be made the Scorn or Property of the most despicable of his Adversaries;

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saries; or if the Animal has Strength enough to act, it is perhaps to betray his Countrey, or his Friend; fly in the Face of his Benefactor, contradict his Being, and blaspheme his God. Yet all this, and all Mischief else, that can be almost imagin'd, has been the wretched Effects of that Vice call'd Drunkenness: And were it lawful to speak in such a manner, if there be any Iniquity yet unacted, we might say 'tis perhaps in reserve for a drunken Freak. On the other side Vanity and Self-sufficiency will make a Man an utter Stranger to himself. When once any one has gain'd a very kind Opinion of his own Accomplishments, he is always at Clambering and Enterprize; nothing too high, nothing too great for his Ability and Acquisition. His Merit is superlative, and mount he must, or all the World be branded with Ignorance and Stupidity, for not discerning so excellent a Person; the Ways, the Means, the Consequence, or the Dangers, are either quite out of his Scheme, or he esteems them

The P R E F A C E.

them the timid Doubts of a Paltroun: If he but ascends, he cares not if it be like the Tortoise in the Eagle's Claws till he's got to the Clouds, when to his amazement he is made sensible that there's no Living for him there, and his Descent must be to a sudden, unpitied, and irreversible Destruction.

Would Men but weigh themselves, measure their own lengths, and be sincere upon the result in the Advice they might give themselves upon such a Deliberation, nothing perhaps would more prevent, or remedy the Unhappinesses that are or may be amongst Mankind; but by wrong Names or false Appearances we are at once mistaken and undone, and 'tis well (tho' it seldom happens) if we perish alone.

In no part or way of Life would this Rule be more serviceable, as a moral Precept, than in the Practice of Physick; and some Physiologists have transferr'd from a moral to a literal signification, in the encouragement towards the know-

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ledge of the Animal Machine, so absolutely necessary to a rational method of curing Diseases, and so have placed Nosce Teipsum at the Head of their Anatomical Discourses.

Were the many thousands of Empiricks but a little acquainted with themselves, and their own Ignorance; from a consciousness of their Insufficiency and Guilt, a Man of Honesty or Judgment would think, that they must quit and repent; but that, I doubt, is only to be hop'd for.

Nothing certainly is more absurd, than the Actions of these Creatures; should a Person sick of any Disease, send to a Physician, that he was sick and wanted his advice and assistance; and the Physician should send him Medicines, and afterwards come to enquire into the particulars of his Distemper; could we with patience bear such a proceeding. And yet the case is rather worse, as it stands between the poor sick Person and these Wretches, who are so far from knowing anything of rational Practice, that they
decry

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decry it as a thing unnecessary, and were the case never so plainly laid before them, are incapable of judging, in as much as they are entirely ignorant of the Mechanism, Structure, or Affections of a living Body. A Man who can but tell what Hour it is by the Dial Plate of a Clock, may with more probability pretend to regulate all the Motions of the most exquisite piece of Art of that kind, than these ignorant Pretenders to act, or direct anything in a regular or legal manner in the business of Physick. But Dr. Kiel has so abundantly refuted any of those vain Pretences, in his Preface to his excellent Treatise of Animal Secretion, that no more need be said of it here.

*Anatomy being look'd upon as the Foundation for the Practice of Physick, whoever has endeavour'd at the Discovery of any of the Parts or Functions belonging to human Bodies, has always met with the Encouragement of the Ingenious, and Masters of the Art. As to the ensuing Discourse, I am willing to acknowledge
with*

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with as much readiness, as any one can be to charge it; that it has met with more Encouragement than I expected, and much more than it deserves: And whether in relation to the Subject, or the Author, never did any thing appear in the World, that more wanted Protection or Defence: As to the first, some parts of it are intirely new, and does therefore, in some measure, contradict all the Opinions both of the Ancients and Moderns; which opposition alone is sufficient to deter one of greater Courage, than ever I pretended to in this way. For this Reason I have been obliged to make use of my small Forces by way of Stratagem and Advantage; not daring to expose them all at once. Sometimes I have proposed what I have been searching for as the Discovery of another: Thus between the late Dr. Tho. Gill, (to whom all the learned Society of the College of Physicians paid a great deference) and my self, the Subject of the Nutrition of the Foetus in Utero, and the Use of the Gland Thy-

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THE PREFACE.

mus, &c. was managed in an Epistolary and Controversial manner for a pretty while ; till that learned Gentleman (to whose Memory I must on all Occasions pay the highest Veneration) was pleased to approve my Thoughts, in the Terms express'd in his Letter hereafter mention'd. Upon Dr. Gill's Death, I had resolv'd to lay by the whole Design, and only intended to have recommended it to some abler Hand, whose better Capacity, and greater Opportunities, might have imparted it to the World with more Advantage : But some Persons, who have a Power over me, would not admit of it. I then laid it before the ingenious Dr. Bateman, whose peculiar Approbation gave a new Life to the expiring Undertaking ; and the kind Allowance of the College confirm'd my Resolutions to expose it to the mercy of the Publick. Thus, Reader, it comes into your Hands, and what kind of Treatment it will meet with there, must be left to your own Judgment and Candour. What I have farther to say on this

Head

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Head is this, that if any one shall think these few sheets worth an examination, I desire only that I may be answer'd by Truth and Demonstration, so far as the Nature of the thing will allow of; for as I have taken a pretty deal of Liberty with others, I can but with Reason expect the same kind of usage may be return'd me: And if we all agree to aim at Truth in our several Researches; it is almost equal to me, whether my own Opinion stand, or be refuted; so it gives but an opportunity of attaining what as yet we have not had the Possession of, that so the World may be the better for one of us.

The Monuments of the Ancients still continue in great Veneration and Repute; and their Writings will ever deserve the Consideration of all Ages to come: And it cannot be deny'd at this time of Day, but that many excellent Discoveries, both in Physiology and Practice, have been made by the Moderns. The last Century was bless'd with the divulging the Circulation of the Blood by

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that great Genius Dr. Harvey; and the course of the Chyle by the Famous Pecquet: Besides these, Malpighius, Bellini, de Graaf, Wharton, Willis, Lower, and abundance more, have render'd themselves not only famous, but useful to all Posterity. And in our Days Dr. Pittcairn, Dr. Mead, Dr. Kiel, with several others by their Investigations of Nature, have found out several of her Operations, and determin'd upon several Propositions, impenetrable to all past Ages: And for Practical Discourses, what of that kind did ever exceed the accurate Descriptions of Dr. Morton and Dr. Sydenham. So true (and beyond peradventure will ever remain so) is that Observation of Seneca, Ista quæ nunc latent, in Lucem dies extrahat, & longioris ævi diligentia.

And it is to be hop'd that the ingenious Dr. Coleby (to whom I am greatly oblig'd for the generous Countenance he shew'd me in this attempt) will once prevail over his Modesty, and oblige the World
with

THE PREFACE.

with an Account, how Chronical Diseases are not only protracted, but become Hereditary; and that all this is owing to the Mechanical, tho' perhaps Male-Formation and Structure of the solid Parts. He is undoubtedly Master of the Subject, and such Discoveries, as they are of inestimable value, so will they ever meet with the most grateful Acceptance and Acknowledgments from all lovers of Mankind. Upon these Foundations will be laid by the learned, a rational and (as far as our weak Constitutions will admit of) a steady and successful Practice: So that those Diseases which have been to the Scandal of that noble Art call'd, the Ludibria Medicorum, will be as much subject to Medicine, as any other. Not by the poisonous Practices and Impositions of Ignorant Quacks, and their pernicious silly Receipts; but by the heedful Attention of the Regular Physician to all the Circumstances, both of the afflicted Person, and the Disease; and an exact Compliance, and manly Constancy of
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THE PREFACE.

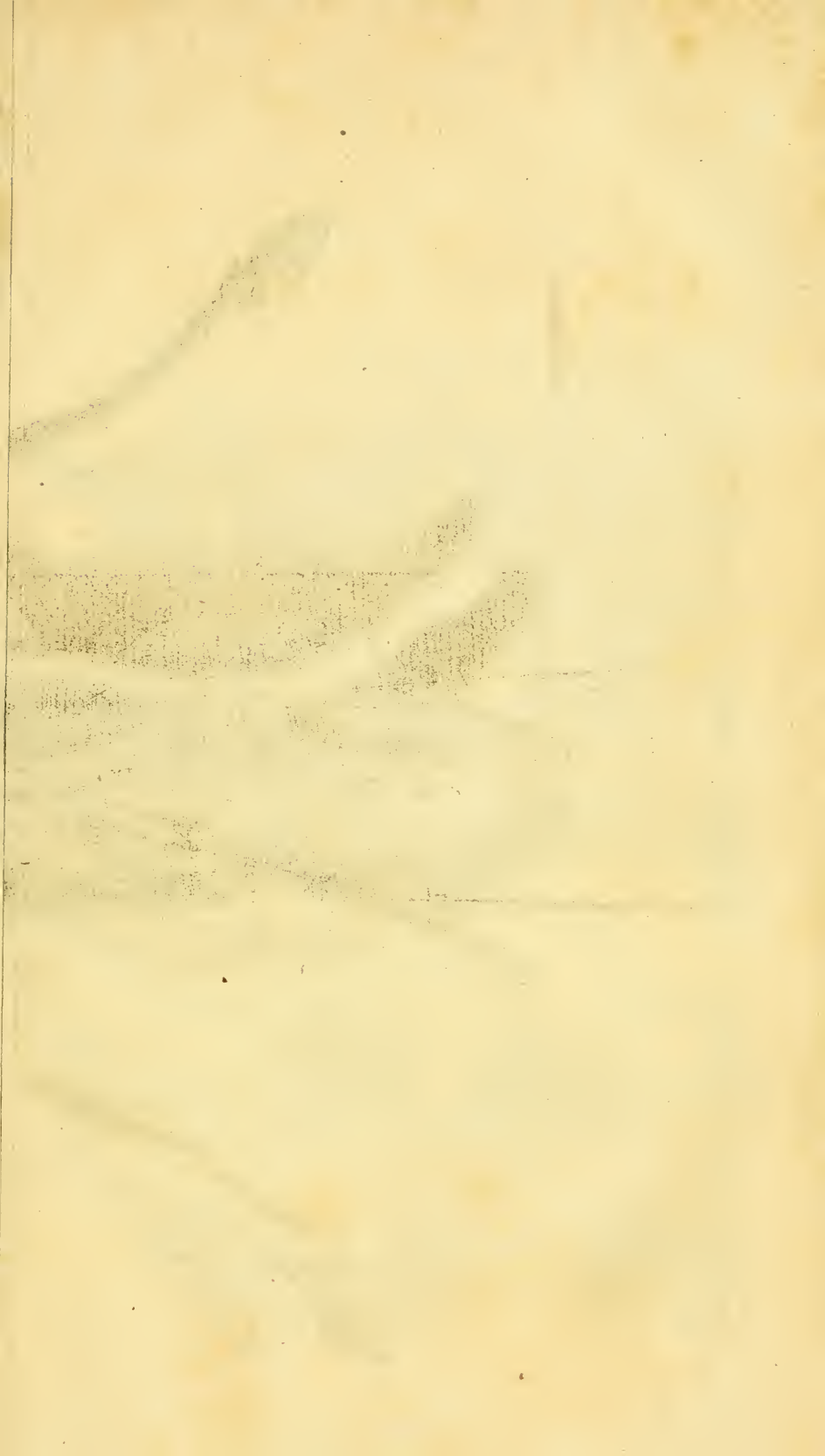
the Patient to the Rules prescrib'd. Thus by Diet, Pharmacy, Exercise, and the like, the solid Parts will acquire such a Vigour, Tension, and Vivacity; the fluids be so regulated and disposed, in their Parts, Texture, Cohesion, &c. that with freedom they will be able to pass any parts of the whole Systema Vasorum, without obstruction. From my own comfortable experience I know the Gout to be curable by such a method; but if People will give ear to the false insinuations of mercenary and ignorant Pretenders, their own Suffering must be the Punishment and Reward, as it will ever be the Consequence of such Proceedings; but of this enough.

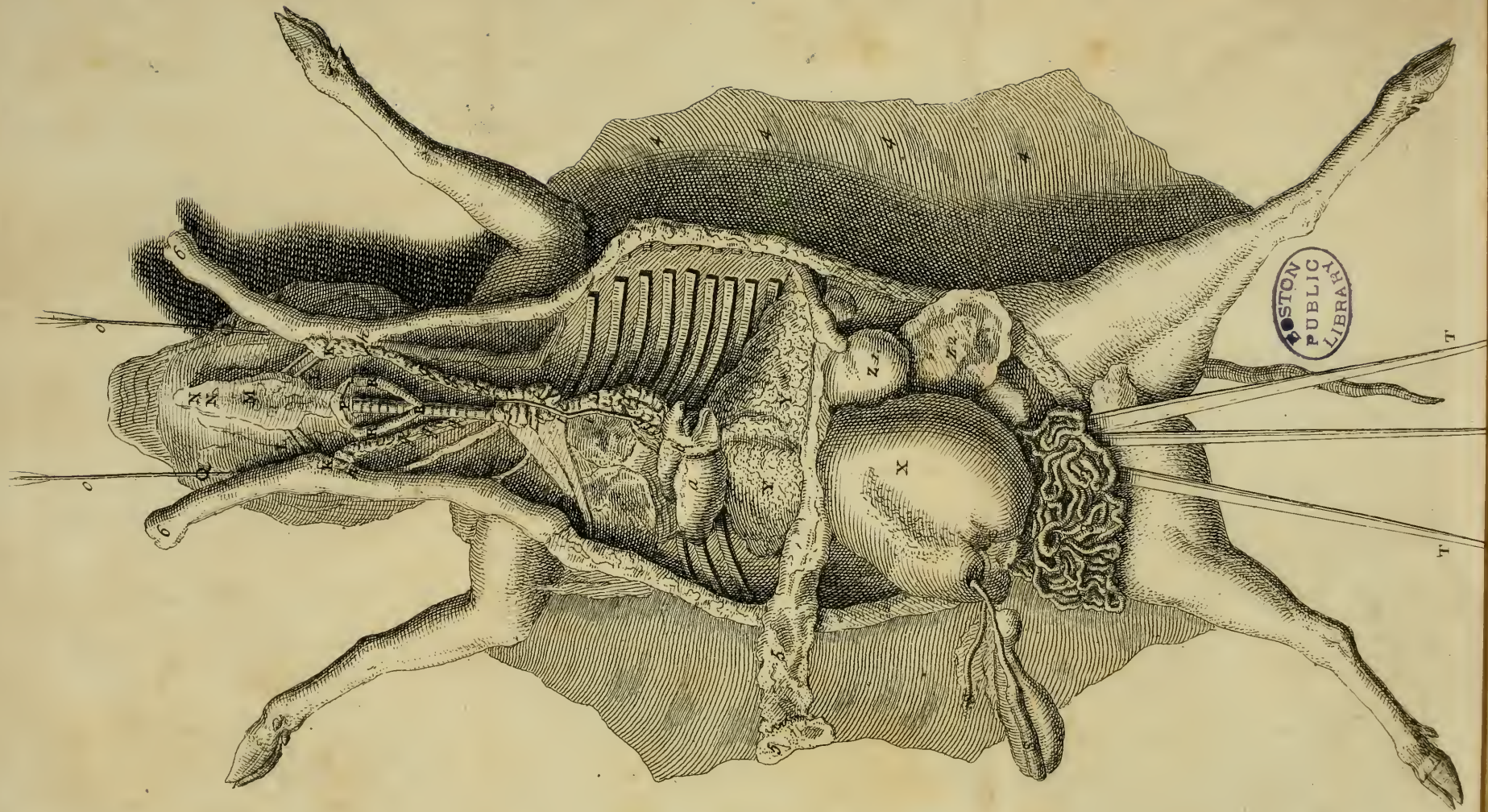
I shall not trouble the Reader with any previous account of this little Tract, or the usefulness of it: The only part I shall speak of here, is the Appendix; which at the Request of some People, I drew up in a little hurry. And as it is the only practical part, it may be thought I have pass'd it over too hastily, since I have

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have not descended to give the formal Recipe in the cases hinted at. To which I hope this Answer will be sufficient, that if People are once convinced of the unreasonableness of the common way of proceeding in the Case mention'd; the forming Receipts, according to the variety of Indications, and impending Symptoms, will be very easy: Besides, it may perhaps hereafter be enlarg'd on.









A
DISCOURSE
Concerning the
NUTRITION
OF THE
FOETUS *in the* WOMB, &c.



CHAP. I.

The INTRODUCTION.



AS the Method and Manner of Generation, as well as the Materials of which it first consists, and from whence the *Fœtus* first springs, and has its Original, (I mean as to what is done and contain'd within

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the Female after Copulation) has been, and still remains, one of the most impenetrable Mysteries of Nature; so the Nutrition of the *Fætus* when generated, and all the Parts, not only visible, but perfect, has continued hitherto unknown, at least undetermin'd.

And indeed we have not so much reason to wonder, that the first should be so inscrutable, where all things seem to be so hidden, and as it were under an industrious concealment of Nature; where the Beginnings are so minute, the Passages inaccessible, and many of the constituent Parts invisible: And not only so, but even those which we can have the opportunity of seeing, we can only observe superficially; being by their tenderness and friability so untractable, that we are forced to take a mere outside view of them. For if we prepare them by boiling, or otherwise to render them so hard, as that we may handle them, and otherwise treat them; we have great reason to suspect, that by such preparation, the Parts are so alter'd in their appearance and situation, that after all our trouble, it may be that we have taken a great deal of pains, only to impose on our own Senses. That this is not mere supposition, take this one instance. It is now allow'd by all, ever since the time of the learned Dr. *Harvey*, that the little orbicular Spot affix'd to the Yolk of an Egg, is the place where the Parts of the Embryo first are form'd, become visible, and
for

for the sake of which all the rest of the Egg is made: Now if we boil an Egg, this so principal a part is almost, if not quite, obliterated, the Membrane by which it adher'd to the Yolk broken, and the whole is confounded with the Yolk. Yet this is the way that Monsieur *de Graaf*, and other excellent Anatomists, have taken to discover what the constituent Parts of the *Ovum* in the Testicles of viviparous Females are; and by this we may see how liable our most accurate endeavours may be to fallacy and mistake. But I shall be carried too far, and therefore to return. I say we must not wonder that these operations of Nature are so occult, when we find our selves so short sighted, and embarrass'd in accounting for the progress of Nature, in a much more simple and confin'd space; such as is the Nutrition of the *Fœtus in Utero*; the Subject of this present Discourse.

Here, though we cannot see the Aliment pass into the *Primæ viæ*; yet at the first Aspect, we discover that there are but two ways it can enter; and yet still notwithstanding this seeming ease in the direction of Nature, all the Endeavours of the best Physiologists and Anatomists for so many hundred Years, have not been able to determine, which of these is the right and true way. Some assert, that it is by the Mouth the *Fœtus* receives its Subsistence; and that the Liquor it

swims in is composed of chylous alimentary Particles, which it sucks or licks in at pleasure : Others, that it is nourished by the umbilical Vessels, and some believe by both : However, we find that all agree it must be by one of these two, or by both. What has kept the dispute so long in suspense, is, that there are Reasons which seem conclusive for and against each Position : And which may seem something odd, it appears by what we read, or find in Authors, that it is much easier to prove the Negative against the Position of each other, than the Affirmative in the defence of either. Thus in the *Fætus*, we cannot say that it receives all the nourishment by the umbilical Vessels, because of the Contents in the Ventricle, and the *Meconium* in the Intestines, to which there is no inlet, but through the Mouth. And others with equal positiveness and triumph contend, that it cannot be by the Mouth ; for then to what purpose is all that *Apparatus* of Nature by the umbilical Vessels, and their *Propagines* ; through which there is so constant a circulation of Blood, from the Mother to the most noble parts of the *Fætus*, and back again. These and many other Reasons are alledg'd on both sides, for the support of their several Opinions ; and they seem to be of so equal weight, that the later Anatomists have not ventur'd to say any thing decisive on the point, but leave it as very little or very uncertainly

certainly known. Out of many others, I shall select our ingenious Countreyman, the late learned Dr. *Drake*, who in his *Anthropologia Nova*, Book I. Chap. 23. has these words.

“ How the *Fætus* is nourished in the
 “ Womb, has been a Question as much agi-
 “ tated by Anatomists, as any whatsoever ;
 “ some contend, that it is nourished by the
 “ Mouth, others will have it to receive its
 “ encrease, and to grow like a vegetable from
 “ the Mother, as from the Root, of which
 “ the umbilical Vessels are the Stem, and the
 “ Child the Head or the Fruit of this Plant-
 “ Animal, (if I may use that Expression.) But
 “ this Question, and some others we shall
 “ wave here, as containing something of cu-
 “ rious Argument, and deserving a more par-
 “ ticular Discussion.

It looks by this, as if that learned Gentleman had provided himself with some Materials, or at least intended to have treated singly on this Subject: And 'twas an irreparable loss, that his Death prevented the Performance. However, we see what his Thoughts were at the writing of that piece, which I hope is sufficient to justify the present attempt. As for Monsieur *Dionis*, after all his pretence to Demonstration, he slips over it very cursorily, whether through ignorance, design, or inadvertency, I dare not pretend to determine. From all which we may gather, how large a

Field the Animal System affords us ; there being still Parts, or at least the use of them so undiscern'd, as may employ all our spare hours, and utmost industry to search into. From hence also we find, that we must not too implicitly rely on what is deliver'd to us in Books, for then we should make but small advances in Anatomy ; but by examining the Opinions of Authors by our own practical Enquiries, we not only satisfy our selves concerning the truth of any Opinion, but may also happily meet with some fresh discovery to oblige our selves and the publick withal. He that depends entirely upon the Authority of Writers, is, as one well compares him, like a Man walking upon Stilts supported by Crutches ; he may, at a distance, seem a little taller than his Neighbours, but his Motions must be so aukward, and his Progress so slow, that one of a meaner appearance, who carefully examines what is deliver'd, as he goes along, shall make more useful Discoveries and Improvements. This is the Rule and Method I propos'd to my self, when I first undertook the enquiring into the present Subject. For finding the Opinions of Authors so dissonant to each other, that there was little to be depended on from them ; the most positive of them giving but hypothetical or consequential Reasons for the Support of their Assertions ; I was for endeavouring to satisfy my self by Matters of Fact,

as

as often as I could meet with such opportunities, (which indeed were very much interrupted) which of them I might most safely rely on; not doubting at first, but that I should in a little time discover, that the *Fœtus in Utero* must receive its Nourishment by one of the ways describ'd by such celebrated Men. But in this I fell so far short of my expectation, that I found both the *Materia nutritiua*, and likewise the importing Vessels after their being enter'd the *Fœtus*, very imperfectly describ'd, if at all known. This Assertion, I know, will seem somewhat vain and assuming; but I hope to take off the imputation of both by what shall follow.



C H A P. II.

The Disadvantages the Author lies under.

AS I can have no other design in this undertaking, than to present the World with my Thoughts; and that I have been endeavouring to add my small Mite to the Treasury of Letters, *In quibus voluisse sat est*: So I earnestly hope they may be received with Candour, and such allowance, as may and ought to be made to one, who besides labouring under many Disadvantages

of Education, the want of Books and public Anatomical Lectures, the Conversation of Persons frequently exercis'd in Physiologi- cal Debates, and the like; may have besides a pretty deal of malevolent Opposition to encounter withal; to which must be added, the general Disadvantage all Pretenders to new Discoveries meet with; the travelling in unknown and untrodden Paths, where a Man is sure to meet with opposition by Bryars and Thorns, with some heavier Rubbish; besides, that he must frequently want both Light to guide him, and very often Room to move in.



C H A P. III.

The Method of Treating this Subject

IN the Prosecution of the ensuing Discourse, I shall observe the following method.

First, I shall cite the Opinion of the Divine *Hippocrates*.

Secondly, I shall produce the Opinion of some eminent Men, who differ'd from the Sentiment of *Hippocrates*; who, in respect to the present Age, may be reckon'd among the Ancients; though they themselves were *Neotericks*,

ricks, compar'd with those before: Amongst whom will appear such a variety of Opinions, and sometimes even directly contradicting themselves, that it will plainly appear that they were not fully acquainted with the Subject, nor even satisfied with their own Determinations.

In the *Third* place will follow those that have fallen in with the Opinion of our famous Countryman Dr. *Harvey*, who has reviv'd the Doctrine of *Hippocrates*, and refin'd upon it; and which is still supported by the suffrage of most in the present Age. Which besides that these Quotations will prove that I act not the Plagiary by what follows, or pretend to arrogate to my self a Discovery already made to my Hands; will, to the candid and impartial Reader, be a fair stating of the Case. After which I shall endeavour to prove, that it is but by one of these two ways the *Fætus* is or can be nourished; and that is by the umbilical Vessels: And to make good this, I shall prove, First, That the Liquors in which the *Fætus* of viviparous Animals swims, bears an exact Analogy with the albuminous part of an Egg. And Secondly, That neither the one, nor the other, are in the least intended by Nature, for any nutritive Service to the *Embryo*, as neither consisting of such alimentary Particles as has been suggested by Authors; nor in their situation placed properly

ly for such an use according to the common œconomy of Nature. Upon which it will follow, as incumbent on me, to lay down what the true uses of both these Liquors are, to which they are assign'd by Nature. Having done this, I shall then proceed to shew the course of the umbilical Vessels, and prosecute the Circulation of the nutritious Juices through those Vessels, and from them to some other Parts, (*viz.*) into the *Thymus*, and so into the Mouth of the *Fœtus*; and shall, in the pursuance of this Discourse, produce some undeniable instances of Matters of Fact and Experiment, to prove the whole. All which I shall do in as plain, concise, and short a manner as I can; and if I fail in any part of the undertaking, I desire as before, that I may bespeak the Reader's Candour, in as much as it is in some parts entirely new; and may, though I am wrong my self, give so much Light, as that more piercing Judgments may discover the truth, and determine more positively in the matter.



C H A P. IV.

The variety of Opinions in Hippocrates on this Subject, in different Parts of his Writings.

TO begin with the great *Hippocrates*, the Master and Founder of rational Physick, the greatest *Genius* that ever yet arose in the Science ; and in his Writings as eminent for his Candour, as he was famous in his Investigations of human Nature : And yet I cannot come up to the Character which *Macrobius* gives him, *Qui nec fallere nec falli unquam potuit* : That 'twas impossible for him either to deceive, or be deceived ; as due to no human Creature. But in his Judgment on the Subject of the Nutrition of the *Fœtus*, he is as wavering and various as any other Man. In his Book Περὶ Τροφῆς ceu *de Alimento*, he says, Ἡ ὃ ἀρχαιοτέρη τροφή διὰ τὸ ἐπιγαστρὶς ὀμφαλός : i. e. *Antiquius alimentum per abdomen est umbilicus*. That the first Nourishment is carried through the Belly by means of the umbilical Vessels. In his Book de *De Octimestri Partu* ; Ὁ ὃ ὀμφαλός, δι' ἧς αἱ εἰσοδοὶ εἰσὶ τοῖσι παιδίοισι μὲνον ἔσώματι τῇ μήτρῃ προσέχει. *Umbilicus per quem*

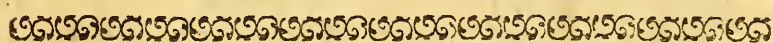
quem introitus infantibus solum ex reliquo corpore matri applicatur. That the Navel and its Vessels are the only Parts by which alone, of all the rest of the Body, there is any entrance, as being the Part that is conjoin'd to the Mother. In his Treatise *De Naturâ Puelli*, he says almost the same thing, “ Κατὰ τὴν μέσον τῆ σαρκὸς ὁ ὀμφαλὸς ἀπέχει,
 “ δι’ ἧς πνέει Ἐν τῇ αὐξήσει ἵσχει, *In medio car-*
 “ *nis adest umbilicus, per quem spirat Ἐ*
 “ *incrementum capeffit.* That the Navel is
 “ placed in the midst of the Body, through
 “ which the *Fœtus* receives both Air and
 “ Encrease”. And yet after all this, in his Book *De Carnibus sive de Principiis*; where he seems to treat more elaborately on the Subject, and to give his Readers Reasons for his Assertions; he is quite of another Opinion. *Heurnius* observes likewise, that there is reason to think, that *Hippocrates* writ this Book in the latter part of his Life; both from the Majesty of the Style, as also that he seems to lay down here, what he had found by Examination and Experience to be true. His words are these, “ Τὸ τὸ παιδίον ἐν τῇ γαστρὶ
 “ σιμῶν τὰ χεῖλεα μύζει ἐκ τῆ μηρῶν τῆ μηρῶν,
 “ καὶ ἔλκει τὴν τροφήν, καὶ τὸ πνέει τῇ καρδίᾳ
 “ εἰσω; ἔλκει μὲν ἀπὸ τοῦ αἵματος τὸ γλυκύτατον,
 “ ἅμα τὸ ἀπὸ τοῦ γάλακτος ἐπαυρῶσκει ὀλίγον.
 “ *At puer nunc in utero compressis labris*
 “ *ex utero matris fugit, Ἐ nutritum Ἐ*
 “ *spiritum in cor trahit; Ἐ quidem trahit*
 ex

“ *ex sanguine quod dulcissimum est; simulque*
 “ *aliquantulâ lactis portione fruitur, &c.*
 “ The Child in the Womb sucks with his
 “ Lips compress’d together from his Mothers
 “ Womb, at which time he attracts both
 “ Nourishment, and some kind of Air to the
 “ Heart; and indeed he not only draws by
 “ this means the most sweet part of the
 “ Blood; but withal, some small portion of
 “ Milk with it”. For this Opinion, he gives
 “ the Reasons following to support it in these
 “ words. “Εἰ δὲ τις ἐρωτοίῃ, πῶς τῷ οἶδέ τις,
 “ ὅτι ἐν τῇ μήτρῃ τὸ παιδίον ἔλκει καὶ μύζει; τὰ δὲ
 “ αὐτῷ ἐσὶν ἀποκρέμνασθαι. Κόπρον ἔχοντα ἐν ταῖσιν
 “ ἐντέροισιν γίνεσθαι, καὶ ἀποπαλῆν ἐπειδὴν γέννηται
 “ τάχιστα, καὶ οἱ ἄνθρωποι καὶ τὰ πρόβατα καὶ τοὶ ἄλλοι
 “ ἂν εἶχε κόπρον, εἰ μὴ ἐν τῇσιν μήτρῃσιν ἔμυζεν.
 “ Οὐδ’ ἀφαιρῶν τὸ μασθὸν ὑπὸ τοῦ γεννώμενου
 “ αὐτῶν, εἰ μὴ καὶ ἐν τῇ μήτρῃ ἔμυζε. Si verò
 “ quis interroget, quomodo hoc sciat aliquis
 “ quod puer in utero sugit & trahit? Huic
 “ ita respondendum: Pueri cum in lucem
 “ prodeunt faeces habere in intestinis inve-
 “ niuntur, & quamprimum nati fuerint
 “ tam homines quàm pecora, illico alvum
 “ deponunt. Atqui nullum haberent ster-
 “ cus, nisi in utero suxissent. Imò neque
 “ mammam illico ut natum est animal su-
 “ gere nôsset, nisi in utero suxisset”. This
 variety of Opinion in so great a Man, has
 drawn his Followers into as many different
 Sentiments: Galen is of the same Opinion
 with

with *Hippocrates* in his Book *De Formatione Fætus*, Chap. 15. And yet this Doctrine did not last; for several that came after, *Hieronymus Fabricius*, *Laurentius*, *Heurnius*, *Prosperus Martianus*, with many others; some of whom entirely deny'd the *Fætus* to receive any Nourishment at the Mouth; affirming that all that conduced in any respect either to the Nutrition, or the Augmentation of the *Fætus*, is convey'd to it from the Mother, through the umbilical Vessels, by the mediation of the *Fecur Uterinum*, as the Ancients call'd it, that is, the *Placenta*. Others say, that the *Fætus* receives its Nourishment by both; first by the umbilical Vessels, and afterwards by the Mouth. We shall examine one or two of them apart, which will set the matter in a fairer Light. But before I proceed, I cannot but make this Observation on that inimitable *Genius* the great *Hippocrates*, to understand whom, is justly looked upon to be no small advance in Physick. And even in this place his great Modesty may be seen, that he does not pretend to impose his Opinion magisterially on the Reader, (though certainly no Man living had ever such a right to do it) but where he cannot be positive himself, endeavours to convince his Disciples by natural Consequence, and rational Probabilities, whether true or no we shall examine by and by. However, he has given better Reasons for the support of his *Placita* though

wrong,

wrong, than others have done for the maintaining of theirs, though by chance they have fallen upon the right; which how unlikely soever the Proposition may seem to be, in the sequel of this Discourse I doubt not to make it appear to be true.



CHAP. V.

The second Class of Authors, and their Opinions.

BUT to proceed to the second Class of Writers: *Hieronimus Fabricius*, and *Andreas Laurentius*, look upon this place of *Hippocrates* last cited, to be adventitious and not genuine, but inserted by some other for supporting their own Opinions, or for swelling of the Book. The first in his Book *De Formato Fœtu*, Cap. 8. *de Excrementorum Fœtus Utilitatibus*, has these words, “ *Inter-*
 “ *norum autem excrementorum bilis ipsius*
 “ *jecoris excrementum censetur, attractum*
 “ *quidem, à fellis vesiculâ, familiaritate*
 “ *substantiæ, ut oblectetur. Quemadmodum*
 “ *mucosus & albus humor in ventriculo*
 “ *contentus ipsiusmet ventriculi tenue excre-*
 “ *mentum existimandum est. At excrementa*
 “ *illa nigra, crassa, compactave in recto*
 “ *intestino,*

“ intestino, & colo collecta, sive dicas ven-
 “ triculi & intestinorum esse crassum excre-
 “ mentum, sive jecoris, sive lienis, sive ex
 “ omnibus mistum : Ita ut hæc omnia in-
 “ strumenta in cava hæc loca quasi in cloacas
 “ superflua deponunt, probabilem, uti opinor,
 “ sententiam afferes. Neque enim hoc loco
 “ sententia Hippocrati attributa in libro de
 “ Carnibus admittenda est cum ab Hippocra-
 “ tis splendore ac dignitate longe distet. Qui
 “ propter hujusmodi crassa compactaque ex-
 “ crementa in intestinis Fætus collecta pue-
 “ rum labia comprimendo ex utero matris
 “ sugere, &c”. Whatever might be the Judg-
 ment of *Fabricius* on this place of *Hippocra-*
tes, and his great civility he pays to his Me-
 mory ; or whether the place he censures be
 genuine or no, there is certainly more Physio-
 logical Reason contain'd in it, and more be-
 coming an Anatomist, than the trifling Emen-
 dations *Fabricius* is pleased to substitute in
 its room. Can any thing be more irrational
 than to imagine, that the Contents in the
 Stomach and Guts are Excrements of those
viscera alone ; with a small addition of I know
 not what little Portion of Bile, with some
 other excrementitious *Depositum*, from the
 Spleen and Liver ? We may as well suppose
 that the Blood contain'd within the Arteries
 and Veins, are Recrements of these Vessels,
 but it is not worth time to say more of it.

Laurentius proceeds a little more cautiously, and more like an Anatomist. He, speaking of the Nutrition of the *Fœtus in utero*, Lib. viii. Cap. 6. says, that at the first Conception, the Life of the *Fœtus* is so minute and simple, that it lives upon it self, without any Nourishment at all, till the Parts are as it were unfolded and extended. “ *Pri-*
“ *or illa fœtus, primis post conceptum die-*
“ *bus, simplicissima est, & sine nutricatu per-*
“ *ficitur, postquam verò discretæ sunt par-*
“ *tes & delineatæ, statim & nutriri & au-*
“ *geri incipit embryo*”. He then proceeds, after reciting of the Opinion of the great *Hippocrates*, to shew the manner of its Nutrition according to his own Judgment. “ *Fœ-*
“ *tus cum solum sanguinem trahat, ei ali-*
“ *am formam, speciemque non præbet, sed*
“ *perfectionem tantum & temperiem sibi si-*
“ *milem: propterea nec chylosin ullam, nec*
“ *novam hæmatosin, sed tertiam tantum*
“ *coctionem, quæ singularum partium pecu-*
“ *liaris est nutritio, fœtui concedimus. Hu-*
“ *jus tertiæ, & solæ coctionis, in puello*
“ *hæc vera est ratio. Fœtus materno utero,*
“ *vasorum & membranarum interjectu, al-*
“ *ligatus, per oscula venarum miro artifi-*
“ *cio coeuntia, maternum sanguinem trahit,*
“ *eumque in hepatis corpus refundit. Ibi*
“ *magis magisque perficitur. Mox per por-*
“ *tæ radices crassior crudiorque ejus pars,*
“ *in ventriculum, lienem, & intestina di-*
“ *stribuitur* :

“ *sribuitur: Cujus reliquæ per Splenicum,*
 “ *Æ mesentericum ramum in cavitatem in-*
 “ *testinorum amandantur, ibique sensim col-*
 “ *liguntur; Æ diutinâ morâ ita resiccantur,*
 “ *ut crassitiem Æ colorem atrum meconio*
 “ *similem acquirant. Purior autem ma-*
 “ *gisque percocta sanguinis pars, in cavæ*
 “ *truncum; à quo per ramos, tanquam Ric-*
 “ *ciolos, in singulas corporis partes diffun-*
 “ *ditur*”. This is a fair Description, so far as
 at that time the Passages were known, and
 the Uses supposed to be discover'd; so that
 there is something more than mere *Hypothe-*
sis offer'd; but the Circulation of the Blood
 has more than sufficiently made out, that all
 this is a mistake.

Heurnius, whom we mention'd before, has
 a very particular way of solving this difficul-
 ty concerning the Nutrition of the *Fœtus*, as
 deliver'd by *Hippocrates*; he makes no questi-
 on but that *Hippocrates* said it, and also that
 he meant what he said; but with a kind of
 Gloss upon the Text says, that this was but
 a *Modus Loquendi*, a kind of *quasi dicat*, as
 he himself in the following words expresses it.
 “ *Multi hic immeritò reprehendunt Hippo-*
 “ *cratem, non (quod malè putant) ipse ex*
 “ *suâ sententiâ dicit fœtum in utero sugere*
 “ *ore* [Sed concessione quâdam utitur ex
 “ *receptâ tunc sententiâ] q. d. vos pro rato*
 “ *habetis infantem sugere in utero, quia*
 “ *natus mox alvum deponit: igitur mihi*
 “ *illud*

“ *illud concedetis etiam, quod longè facili-*
 “ *us est, eum spiritum trahere, saltem à*
 “ *matre, &c*”. So that we are to under-
 stand, that *Hippocrates* is not arguing for the
 Nourishment of the *Fætus* at the Mouth, or
 indeed any other way ; but that he is contend-
 ing with *Democritus* and *Epicurus* about the
 inspiration or breathing of the *Embryo* in the
 Womb ; which he would maintain, as this
 Commentator afterwards goes on. “ *Si la-*
 “ *bris non prolectaret ex utero, fæcum ex-*
 “ *pers esset, hac enim primæ non secundæ*
 “ *coctionis excrementum esset. Hæc coctio*
 “ *non fit in hepate, sed in ventriculo : nec*
 “ *enim ex umbilicali venâ in ventriculum*
 “ *abire potest alimentum. Igitur embryo*
 “ *trahit alimentum labris : igitur magis spi-*
 “ *ritum, qui meabilior est alimento. Sed*
 “ *umbilicalis vena inseritur hepati, in eâ*
 “ *fissurâ ubi vena porta est ; & ex venâ*
 “ *portâ infinitæ venæ ad intestina fundun-*
 “ *tur. Ergo etiamsi per os nutritum non*
 “ *sumat fætus atræ quædam fæces concipi-*
 “ *erent. Sed quamvis sciverit hæc Hip-*
 “ *pocrates, concedit ut suum argumentum*
 “ *ducat. Fuit enim Democriti & Epicuri*
 “ *opinio fætum in utero per os alimentum*
 “ *trahere.* The rest I omit.

I see very little Reason for this kind of Ar-
 gumentation ; for few of the Commentators,
 either ancient or modern, but have taken the

Expression in the plain and grammatical Sense of the words.

That of *Fæliz Platerus* shall follow next, who in his Tables says. “ *Fætus habet ve-*
 “ *nam quæ ducitur ab umbilico, simplex in*
 “ *medio anteriori sedi peritonæi nexa, sur-*
 “ *sum ad hepar, cujus rimam subiens, sub-*
 “ *stantiamque perforans, venæ portæ ra-*
 “ *mis, bifurcata prius, jungitur. Sangu-*
 “ *nem maternum, cum non per os cibum su-*
 “ *mat fætus, ad hepar illius deducit, ut*
 “ *magis illic elaboratus ipsius Naturæ se*
 “ *accommodet, ipsumque deinde enutriat, &*
 “ *augeat.*

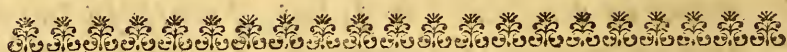
I shall trouble the Reader but with one more, and that from *Adrianus Spigelius*, as one who discusses the matter very elegantly, and came very near the time of our great *Harvey*; at whose appearing, Anatomy in many respects, took a very different turn. After he has recited the various Opinions of those who were call'd Ancients and Moderns in his time, as is before quoted, he offers his own Judgment in this manner. *Lib. de Formato Fætû, cap. 13. de excrementis Fætûs,*
 “ *Ego autem, quanquam à liene & toto*
 “ *corpore amandari posse per venas mesen-*
 “ *terii in intestina, non negem; tamen ex-*
 “ *istimo, non esse expurgationem ejusmodi*
 “ *sanguinis crassioris, qualis, dum adhuc in*
 “ *utero est fætus, & bene valet, in venis*
 “ *continetur, & qualem natura semper co-*
 “ *natur*

“ *natur facere vel convenientem, vel neces-*
 “ *sariam; quandoquidem sic ad sanguinis*
 “ *illius per venas expurgationem ora vaso-*
 “ *rum non sine noxâ fœtus aperiri debe-*
 “ *rent, &c. Ideo potius dico hæc excre-*
 “ *menta crassa, nempe papaver, generari à*
 “ *liquidioribus in stomacho, & intestinis*
 “ *tenuibus contentis, quæ partim sunt*
 “ *pituitosa, partim biliosa. Fluit biliosa*
 “ *materia ex folliculo fellis, pituitosa verò*
 “ *ex ventriculo, sed maximè à capite; quod*
 “ *neque per nares, neque per os, occlusis*
 “ *omnibus his meatibus in utero, expurgari*
 “ *potest. Hinc necesse est, ut per æsopha-*
 “ *gum in ventriculum illa dilabatur.* This

account of *Spilegius* is somewhat confused, and not entirely consistent, as appears from the words themselves; he very justly raises doubts rationally enough, but does not take any care to solve them; neither does he, notwithstanding that *necesse* he mentions, any otherwise than hypothetically prove it; and yet he values himself very much on the discovery of the expurgation of the *Pituita* from the Head into the Stomach, and seems to say, that no one either of the Ancients or Moderns knew it; except *Hippocrates* and himself.

These, out of many others that might be collected, are sufficient to shew the different Opinions of former Ages, concerning the Nutrition of the *Fœtus* in the Womb; by which

we may see, that the Authority of *Hippocrates* and *Galen*, was not sufficient to satisfy the Naturalists who succeeded them; though they themselves were not able to demonstrate the truth on the contrary; all their accounts being so much worse than precarious, that by Demonstration they may easily be proved to be false.



C H A P. VI.

*The Opinion of the Moderns, beginning with
the great Harvey.*

WE come now to consider, the Opinions of the more modern Times on this Subject, beginning at the great, the immortal *Dr. Harvey*. Amongst other Errors that were detected upon the Discovery of the Circulation of the Blood; the carrying of the maternal Blood from the Liver of the *Fœtus*, to the Ventricle or Intestines of the Child, and some part of it there deposited as Recrements of the Blood, of which was form'd the *Mæconium*, was an Opinion that necessarily drop'd, and was exploded: So that there arose a necessity of assigning some other way for the Nourishment of the *Fœtus*, as well as other Magazines from whence it was to be supply'd.

ply'd. As Dr. *Harvey* quotes himself in his 52. Exercitation *De Generatione Animalium*. And his 57. Exercitation of the same Book, he begins; "*Quam non sit temere negligenda*
 "*veterum auctoritas vel hinc apparet; fuit*
 "*olim celebris opinio (quam tamen tanquam*
 "*erroneam plerique hodie rejiciunt; & Fa-*
 "*bricius ceu deliramentum stultamque opi-*
 "*nionem impugnatum it) embryonem in ute-*
 "*ro sugere: Habuitque Democritum, Epi-*
 "*curum atque etiam Hippocratem adstipu-*
 "*latores. Et Hippocratis quidem ratio duo-*
 "*bus potissimum nititur argumentis: Nam,*
 "*inquit, nisi suxisset, quomodo excrementa*
 "*faceret, aut protinus à partu sugere no-*
 "*visset*"? Thus we see, as is before said, he is endeavouring to revive the Opinion of *Hippocrates*, that the *Fætus* received some part at least of its Nourishment at the Mouth. And in the next Paragraph thinks it strange, that in most other respects the Authority of *Hippocrates* should be thought sufficient to determine all disputes, his *ipse dixit* being enough to silence all Controversy; yet here *Fabricius* and others not only reject his Opinion, when he affirms it, but deny also the Reasons he brings for its Support. But whether the Observations our Author has made in the Generation of Animals, has render'd the Opinion of *Hippocrates* probable, if not necessary, he leaves to the decision of the learned among the Physicians and Anatomists. He after-

wards proceeds gradually to shew his Reasons for dissenting from *Fabricius*, and others, as to the use of the Waters in which the *Fætus* swims; he agrees with them, that they are design'd by Nature for the defence of the *Fætus*, that it may meet with no damage in its tender Limbs, when the Mother runs, leaps, or uses any other violent Exercise, "*Agnosco,*
 " says he, *libenter utilitatem ab omnibus*
 " *positam, scilicet, ut tenellus fætus à su-*
 " *bitaneis & violentis matris motibus in-*
 " *demnis sit, tutò adeo in alis vespertilio-*
 " *num, uti vocant, appenditur, & copiosâ*
 " *aquâ circumcingitur; ut faciliè quovis*
 " *(etiam violento) motu materna latera*
 " *(propter utrinque collocata retinacula)*
 " *tangere nequeat; saltem liquor iste circum-*
 " *ambiens, in medio libratum, ab omni*
 " *externo nocumento protegat*". Before I proceed any farther with this Author, I will venture, in conformity with him, to affirm, that during the time of Gestation, this is one of the greatest uses of it: He positively denies that it is of any use in lubricating the Passages for the Birth; and though I see no reason totally to reject that use of it, I shall not insist on it. But then, as to his asserting that it is not of any acid or saline Taste, is what I must take leave to say the contrary to, in which any Person may satisfy himself by tasting the Liquors contain'd in the *Chorion* and *Amnios* of the larger sort of Animals;
 that

that is, of such which carry their young a great while, as Cows, &c. which for two Months or more, before the time of their bringing forth are palpably saline, and of an urinary Taste, though not so strong; and if you boil them, they all evaporate, and leave nothing behind, but a *calx* like Substance, like that of Urine; but more of this by and by.

To go on a Paragraph or two farther, he says, “*Verisimilior itaque mihi videtur sententia Hippocratis, quàm Fabricii & aliorum Anatomicorum, qui liquorem illum pro sudore habent, noxamque fœtui afferre statuunt. Crediderim, inquam, colliquamentum hoc, aquamve in quâ natat fœtus, ei pro alimento inservire, partemque ejus tenuiorem & sinceriorem intra venas umbilicales haustam, primogenitas fœtus partes constituere & augere; ex reliquo autem, ceu lacte per suctionem in ventriculum deglutito, ibidemque cocto, ceu chylicato & venarum meseraicarum operâ attracto, novellum embryonem nutriri & crescere*”. Having thus revived the Doctrine of *Hippocrates*, he proceeds to shew the Reasons on which it is, or may be established and proved; many of which are the same which *Hippocrates* had before mention'd; to which he adds some Observations of his own. As, First, That he has observ'd the Chick in the Egg to open its Mouth; and
that

that upon this it is impossible, but some of the Albuminous Liquor must enter the Mouth, which if it does, it must follow, that the Chick must swallow it. And therefore as he goes on afterwards in an Analogical Deduction, if the *Embryo* which swims in so copious a Liquor, opens its Mouth (which the Reader may perceive he takes for granted) there follows a necessity that the Waters must enter; which if it does, he thinks it but common Reason to believe, that the *Fœtus* may as well make use of the Organs and Muscles destin'd for deglutition, as of any other motion. He next endeavours to demonstrate, that in the Craw of a Chick, and likewise in the Stomach of the *Embryo's* of vivaporous Animals, is always found a Liquor, which in colour, taste, and consistence, is very like the *Humores uteri* encompassing the *Fœtus*. That in the small Intestines it is found in the form and appearance of limpid Chyle, and that the great are full of Stercoraceous Excrements: Upon which he says, “ *Quid dubitemus igitur affirmare fœtum in utero sugere, & in eo fieri chylificationem: cum tam manifeste ejus adsint, tum principia, tum re- jectamenta:* And therefore positively concludes: “ *Embryo itaque per os victum quaerit & sugit.* To this he offers afterwards several other Arguments *ex Abundanti*; some from the Authority of *Hippocrates*, others from his own Observation, which he thinks
conclu-

conclusive; such as is the readiness of the Child to suck, as soon as it is born; which he presumes could not be, had it not been accustomed to it some time before, and the like. Much more might be produced out of this celebrated Author; but I doubt I have been too large in my Quotations from him already. The Reason I have been the more particular, is, because those who follow'd him have built upon his Foundation; and therefore he is generally look'd upon as the reviver of this Opinion. For *Bartholine*, though he seems to carry his observations farther in his dissection of Whelps, in as much as he says, that he not only found a Liquor in the Stomach of these Animals before their Birth, very like that contain'd in the *Amnios*; but also that he observed farther, that the same was to be found in their Mouths; and that they swim in this Liquor *ore aperto & linguis nonnihil exertis*, with the Mouth open, and their Tongues a little put out, in order as is supposed, to lick it in; yet this, and whatever else is advanced by *Rudbeckius* and others, is little more than repetition or exemplification of what *Dr. Harvey* had at first laid down.

C H A P. VII.

The Opinions of Monsieur Bayle, and Monsieur Jussieu, separately consider'd.

MONsieur Bayle and Monsieur Jussieu, are the most positive in asserting the Nutrition of the *Fætus* to be at the Mouth, of any I have met withal; who are so far from admitting of any Nourishment to be communicated to it at any other place than the Mouth, that they will not so much as admit of any Circulation to be continued between the Mother and *Fætus*. The first of these Authors in his *Dissertationes Medicæ*, Cap. 3. *de Utilitate Lactis ad tabidos reficiendos, & de immediato Corporis Alimento*, says,

“ *Natura enim, quia quod nutritur, si-*
 “ *millimo eget nutrimento, ut, quem è lacteo*
 “ *formavit succo, nutriat in utero fœtum,*
 “ *lacteum ipsi succum circumfudit, quem ore*
 “ *sugat, &c*”. And in two or three Pages after, he insults over the ignorance of those, who should offer to affirm, that the *Embryo* should receive any Nourishment at any other place. The Expressions are so positive and dogmatical, that at first sight no one would think

think but that he had been able to demonstrate it mathematically.

“ *Advertendum est fœtum in utero ore*
 “ *nutrimentum accipere: quod olim obser-*
 “ *vavit Hippocrates, quodque jam luce cla-*
 “ *rius effectum est accuratioribus observati-*
 “ *onibus, quibus compertum est fœtus nuper*
 “ *in lucem editi ventriculum liquamine, cui*
 “ *in utero innatabat, esse refertum; pullorum*
 “ *etiam gallinaceorum recenter exclusorum*
 “ *ventriculum ovi liquamine plenum repe-*
 “ *riri. Nec dicat aliquis id non vetare quo*
 “ *minus fœtus maternum sanguinem per*
 “ *umbilicum accipiat, sicque saltem ex parte*
 “ *sanguine nutriatur. Hoc enim eos fortè*
 “ *moveret, qui res negligentius intuentur,*
 “ *¶ plerumque oculis alienis, ¶ malunt le-*
 “ *vissimis conjecturis fidem adhibere, quàm*
 “ *laboriosâ indagine rerum scientiam com-*
 “ *parare*”. The Industry here recommend-
 ed by Monsieur Bayle, is certainly very lau-
 dable, and that supine Remissness, which is too
 frequent both in Speculation and Practice, is
 justly censur'd: Too many chusing to sit down,
 and take what they find in Authors upon
 trust, and resign their Understandings to their
 Common Place Book, rather than discompose
 themselves in the troublesome and laborious
 search of practical Anatomy. But yet this is
 much better, than to take a great deal of
 pains to propagate Errors, and by pretended
 Inventions and Discoveries deny the common
 Function

Function of the Parts ; which will appear to be the case of the Author before us. He descends, after the Prefatory Discourse before cited, to Matter of Fact ; and endeavours to confirm his Allegations by anatomical Experiments.

“ *Ut Rem experimento comprobarem, monente Galeno, in iis quæ possunt sensu deprehendi, aliis non esse fidem adhibendam.*
 “ *Ut soleo interdum animalia secare, ad certius indagandam corporis œconomiam, ejusque partium usus varios ediscendos, hæc in parte summam quam potui adhibui diligentiam. Aderant aliquando medici clarissimi, alique viri eruditi, cum res ita successit. Secabam canem vivam tribus catellis fœtam, apertoque uteri cornu dextro, in quo catellus unicus, sed reliquis longè major, continebatur, duas illas placentæ seu allantoidis partes separabam, sine ullâ laceratione, sine ullâ sanguinis profusione, ut ne quidem guttula, aut vestigium sanguinis apparuerit, &c”.*

From hence he thinks reasonable to conclude, that the *Fœtus* is so far from receiving any Nutriment by the umbilical Vessels, and the maternal Blood, that there is no manner of Communication, as to the Blood Vessels, between the Mother and Child. The Experiment he made, together with its consequential Circumstances, as related, was undoubtedly true ; and I have my self perform'd it
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very frequently, not only in Whelps, but also in Calves, Lambs, Pigs, &c. after the like manner as Monsieur *Bayle* speaks of; and it is no more than is perform'd by Nature at the Birth in all viviparous Animals. But the Conclusions he draws from it, I must, with Monsieur *Bayle's* good leave, say are not regular, but founded upon a fallacious observation.

That the *Placenta* consists of two Parts, one of which adheres to the Womb, and the other is the Ramifications of the umbilical Vessels dispersed through the *Parenchyma* of a Glandular liver-like Substance, form'd by Nature for that purpose, is most true: But to conclude that there is no communication of the Blood Vessels between the Mother and *Fætus*; because there follows in some subjects no Blood upon the Division, is what I must take leave to contradict; not only from the Authority of several accurate Anatomists, who aver the contrary, but from Experiment and Facts undeniably true. The flowing of the *Lochia* in Women, and their floodings some time upon the Birth is one, in my Opinion, conclusive, that the separating of the Vessels of that part of the *Placenta* conjoin'd to the Navel String, leave the Vessels which before communicated with them open; till by their natural Elasticity they curl up, or contract, and so prevent the discharge of any more. This is the Case of the Fact in Women; but in most other Animals, the Blood Vessels of

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the *Cotyledones* are by provident Nature immediately seal'd up upon the separation.

It is about four Years since that I knew the like case in a Woman, whose *Lochia* flow'd not for more than about two hours after delivery ; though she made use of some pretty strong Hystericks. Her Relations, and also her self, being somewhat alarm'd at the novelty of the Case, I was sent for about forty eight Hours after her being Deliver'd. I found the Person (for a Patient I think I could not properly call her) in a very healthy disposition, and every thing that regarded her Child-birth, natural and perfect : The only thing I could observe that was disorder'd was her Pulse somewhat quicker than natural, which might be occasion'd as well from the hot things she had taken, as from the obstruction of the *Lochia* ; though I do not deny, but that also might in part be concern'd as one Reason. Nothing else was observable in this case, except that her Breasts were, at that distance from the Birth, more than usually turgid ; for she very soon recover'd perfect Health, and so continued.

The use I make of this Relation, which is somewhat extraordinary, is this ; that in Answer to this learned Author, we are not altogether to rely on some Experiments, and accidental Occurrences in accounting for all the proceedings in the animal Machine. For the flowing of the *Lochia* is by the universal consent

sent of almost all Anatomists, and from Matter of Fact, and Autopsy, derived from the Vessels that were, before the separation, conjoin'd to the Vessels of the *Placenta* of the *Fætus*; which I think a sufficient Answer to what he has said to the contrary. But farther, the Separation which Monsieur *Bayle* speaks of, could never be perform'd but in dead Subjects; for what haste soever is made, we can never come to the dividing the *Placenta* in Gravid Animals before they expire; and consequently all circulation either in or between the Dam and the *Fætus* entirely stop'd: And this Gentleman is not pleased to inform us, when this Dissection was made, or whether either were alive at the time of the Separation. It must besides be consider'd, that the motion of the Blood, when it is perform'd in any Glandular Secretion, is extreamly languid, so that the discernible Parts may have time to enter the several Vessels according to the configuration of their respective pores; and that the *Placenta* is a Gland, and performs the Office of one, is now universally acknowledged. To this we must add, the extreme minuteness the Vessels are reduced to before they come to the secretory Office, of what kind soever it be: *Minimæ structura ope maxima molitur Natura*; as the excellent *Malpighius* observes on Secretion in general, and the Compage of the Vessels in those Offices. And still farther, in the separating of

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those two Parts, the Vessels, of what kind soever they are, must be render'd much less in their Capacity, in as much as by their Elongation their Diameter must necessarily be reduc'd to a less space in the Contraction; so that the fibrous or grumous parts of the Blood (which is that which Monsieur *Bayle* means) may be by this means, and undoubtedly are incapable of passing, the Diameter of the Vessels being reduc'd: and this we find demonstrably true, when we view the circulation of the Blood through a Microscope in the capillary Vessels of the Tail of a Fish, or the Foot of a Frog, where we see the globular red parts of the Blood moving as it were in distinct places from the *Serum*, so that were one of those Vessels pull'd in two, I dare venture to affirm there would not the least speck of Blood appear. In the separation of the *Cotyledones* or *Placentulae* of Brutes, this also ought to be observed, that the capillary Blood Vessels of that part which belongs to the *Fætus*, apparently come from the *Parenchyma* of that part which belongs to the Dam, as out of certain *Alveoli* or little Cells; and by their Elasticity do visibly and immediately contract, and as it were curl up, by which all effusion of Blood is prevented. And it is no difficult matter to trace these smaller Vessels through the glandular *Parenchyma* to the larger Trunks, and so on to the greater, till we come to the great Vein which enters at
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the Umbilick of the *Fætus*. The same may be observ'd and traced to the Hypogastrick Arteries of the Dam, tho' not so easily, by reason of the compactness and toughness of the Membranes of the Womb. What has been said is, I hope, sufficient to invalidate the Assertions of this learned Author, whom I have endeavour'd to answer in a place by himself, by reason of his positive Pretensions in that elaborate Treatise; so contrary to Reason, and the natural Disposition of the Parts. I shall add but one thing more, which is, I confess, Hypothetical, yet I hope reasonable, as a farther account of this Occurrence in Nature, *viz.* the use of the *Mucus* of the *Placenta* on the separation; which as it is of a glutinous mucilaginous Quality, is, I presume, made use of by Nature as a proper Balsam for the sealing up of those Orifices: That there is a considerable quantity of it, any one may satisfy himself by gently squeezing either parts in his Hand, from whence, as from a Sponge, will issue forth a great deal of this Substance; and which may as justly be supposed to be by Nature made use of for this purpose, as for any other after the exclusion of the *Fætus*: The use it is of before, is known sufficiently (*viz.*) to supply continually the *Humores uteri* in which the *Embryo* swims, of which there is a constant accession and expence. When the *Lochia* in Women begin to diminish, they are always observed

to be discolour'd, and gradually to depart from a sanguinary to a yellow, greenish, and so to a purulent appearance; and last of all, are entirely colourless as Water; so that the same method seems here to be observ'd, which we find in the Cure of external Wounds. This is abundantly known to be so in Persons of the best Health, and ought to be so by the constant progress and tenour of Nature: For as the accession of the Blood diminishes, and is mix'd more and more with that kind of Lymph contain'd in the Vesicles of the *Placenta* (I mean that part of it which adheres to the Womb) it gradually loses its red cruentous colour in the manner as is before related.

The other Gentleman, Monsieur *de Jussieu* proceeds upon Arguments altogether Hypothetical; as is evident by the Propositions following, (*viz*).

That the Liquor with the which the *Fætus* ought to be nourished, must be proper for its Nourishment, and ought to appear to be so by its quality, quantity and motion; that these three are to be found in the milky Liquor in which the *Fætus* swims, but not in the Mother's Blood. To the first he suggests, that it is unreasonable to suppose that a Child in the Womb should be nourished with the Mother's Blood, because of its tenderness and sensibility, and the fiery Particles contain'd in the Blood. This Gentleman should have consider'd, that as the Blood is a Liquor of a vast

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Heterogeneity, and does, among the rest, consist of some volatile, saline, and (since he pleases to call them so) of some fiery Particles; so has it many soft, phlegmatick, balsamick Parts likewise in it, fitted for the service of the most tender and friable Offices and Functions; and among the rest, for the Nourishment of the *Embryo*, were it even more tender than it is. The quantity of the chylous Liquor in which the *Fætus* swims, is another Argument our Author makes use of to perswade us, that the *Embryo* is nourished by it: To which he adds, the vast Augmentation of the Body whilst it is in the Womb, compared with the time from its Birth, till it acquires its full growth; which it can no ways obtain from the Nourishment of the Blood; there not being one of its Particles in an hundred which is nutritive.

How many hundred different Particles the Blood may consist of in this Gentleman's *Analysis*, is not easy to determine; but I will venture on the direct contrary, if the definition of Nutrition be the repletion of the solid containing Parts with their proper Fluids, which I take to be true Nutrition in its most strict, and also in its comprehensive Notion; then there is hardly one in an hundred but is nutritious; except those that are specifically denominated to be excrementitious, namely, Urine, Sweat, *Alvi Fæces*, &c. And as to the Child's growing so fast in the Womb, it is

but in part from its Nutrition, for the Parts being tender, they are more susceptible of Accretion ; and being contain'd in a warm soft Liquor more capable of Extension ; but after the Birth, the external Air, the hardness and compactness of the Bones and other parts, Exercise and Labour, and many other Reasons may be given for its quick encrease before, and the slowness after.

The motion of the Blood is another Argument, which being rapid, all the Springs of so weak a Machine would easily be disorder'd ; and for the same reason, the beating of the Mother's Heart would quickly prevail above that of the Child's. To which this plain Answer may be sufficient ; that the motion of the Blood between the *Fœtus* and Mother, is in the *Primordiis* very languid and gentle ; the Vessels that communicate with each other very small, and are extended, and encrease gradually as the *Fœtus* does. Besides, Monsieur *Jussieu* hardly consider'd surely when he said this, how the Blood is intercepted and impeded by the long march it takes through the capillary Vessels of the Mother, before it arrives to the *Placenta*, where it meets with another *remora* ; and farther, the Blood passes into the *Fœtus* in a venal Motion, (if I may use that Expression) and is return'd by the Pulse of its own Heart and Arteries : All which mechanism and contrivance contribute greatly to retard the quick motion of the
Blood,

Blood, and by that means to prevent any such imaginary danger suggested by this learned Author, &c. I shall not therefore at present stay any longer on this part of the Subject, because this, and whatever else is contain'd in him, will be answer'd in the general *Rationale*, which I shall by and by give.

There is but one Author more I shall mention, and that is *Jacobus Sponius*; who in his *Aphorismi novi*, makes the following Comment on the forecited place of *Hippocrates*: After setting down the words of the Text he says,

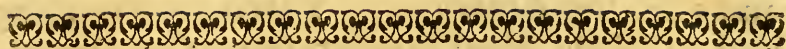
“ *Doctrinam autem hancce Hippocraticam fere sepultam restituerunt recentiores*”. Upon which he quotes *Harvey*, *Bartholine*, and others; but at the latter end of his Comment he questions the truth of the Aphorism in its utmost extent in these words.

“ *At per os tantum & semper nutriri factum, ut Epicurus & Democritus putabant, meritò negat Aristoteles: Nam primis gestationis mensibus os efformatum non est; ideoque nutritioni inservire nequit. Verisimilius itaque perfectis omnibus organis sensim aboleri nutritionem per abdomen, ubi scilicet fœtus circa quartum mensem moveri incipit; quia tunc plus alimenti requirit, succedere verò nutritionem per os.*”

I shall trouble the Reader with no farther Quotations; I reserv'd this for the

last, because it returns us unto our first enquiry.

I have already laid down what the design of these Papers is, *viz.* to prove that the Nutrition of the *Fætus in utero* is entirely and alone at the Navel String, and that it receives nothing at all by the Mouth, that is, through the Lips, during its abode in the Womb: And that I may execute the undertaking with the greater perspicuity and plainness, I shall endeavour at these two things. First, To examine the Reasons that induced so many great Anatomists to affirm, that the *Embryo* receives its Nourishment at the Mouth; which I shall, as I go along, endeavour to answer: And shall then, Secondly, Give the Anatomical and Historical Account of the Nourishment's conveyance by the umbilical Vessels into those Offices of the *Fætus*, which distribute it through the whole Body.



C H A P. VIII.

The several Opinions concerning the Fætus receiving its Nourishment at the Mouth, reduced to particular Heads, and severally answer'd.

BY what has been before recited, the Reasons that induced either the Ancients or the Moderns to believe the *Fætus* receiv'd its Nourishment either in whole or in part at the Mouth, may be rank'd under these following Heads.

First, That the Child knows how to Suck as soon as ever it is born, which it could not do, except it had practis'd it in the Womb.

Secondly, That in the Stomach of the Child is found a Liquor much resembling that it swims in.

Thirdly, Brutes licking their young after the Birth, proceeding (as is supposed) from its chylous Sweetness; this is urged as the reason why the Dam so greedily devours it.

Fourthly, That swimming in so copious a Liquor, and sometimes opening its Mouth;
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it cannot but receive some of the Liquors in ; and that the *Embryo's* of Fowls receive some part of their Nourishment from the albuminous Liquor, and that at the Mouth, is almost universally asserted.

Fifthly, The *Meconium* observ'd in the Intestines of all Animals, which they discharge as soon as ever they are born ; and as they who have written on the Subject were well assur'd, there could be no other way into them but through the Mouth, nor knew of any way for the Aliments to get into it, but through the Lips ; they thought they might securely conclude, that the *Fætus* must suck what lay next to it, and that must be the Liquor in which it swims.

If there be any other, it will be sufficiently answer'd in the general, when we come to demonstrate what is the true way which Nature takes in this great Function.

To the *First*, That the Child knows how to suck as soon as born ; which it could not do, except it had practis'd the same Action in the Womb. I answer, *First*, in general, That there are many things which the young of most Animals perform, of greater difficulty, to all appearance, than sucking ; to which they are prompted by the natural Appetite of Hunger. How readily do they turn themselves to find out the Dugs of their respective Mothers.

Mothers. Will any one say they could have the least hint of this in the Womb? How various besides are their Postures in performing their sucking according to their several *Species*, *Docta indocta natura*, as the ancient Physiologists describe the instinct of Nature, in this and several other of their animal Offices.

Secondly, It ought to be observed, that the *Embryo*, in its very first Being, and most minute Appearance, is enveloped with the albuminous Liquor; at which time 'tis impossible to conceive how it can perform the Action, especially at a time when not only the Mouth is so weak, and according to some, not even formed; but the encompassing Liquors are tough and glutinous, altogether improper for the Nourishment of so tender a Being. For it ought to be always observed, that the Liquors in which the *Fœtus* swims, are by the admirable contrivance of Nature, at first of a much more gelatinous and tenacious consistence than afterwards, and which gradually grow thinner, as the time of the Birth approaches. The Reason of which shall be assign'd anon.

Thirdly, The Action of sucking must be very difficultly perform'd by any Creature, especially a weak one, entirely cover'd with a fluid Water; upon opening its Mouth, according to Dr. *Harvey*, too much may rush in, and how can the quantity be determin'd.

Besides,

Besides, if we consider either the Instrument of the Mother, or the manner of performing it by the Infant, what in Nature can be more discrepant. The Instrument of the Mother is the *Papilla* or Teat; which Nature reaches out as a Duct or *Fistula*, for the Mouth of the Infant to lay hold of. The Action of the Infant is as much, if not more, perform'd by the Tongue and Gums, as by the Lips; and we observe a kind of manducation in the Action, in all Animals whatever. Is there any thing that can bear the least resemblance with this in the Womb? But I shall proceed no farther, though there are abundance of Questions of equal difficulty; but leave it to the Assertors to answer the Question, and make out, with some more semblance of Truth, their Affirmations.

Secondly, Another Reason which conduc'd towards the belief of the Nutrition of the *Fætus* at the Mouth, was, because in the Stomach of it is found a Liquor of the same kind with that it swims in. To which I answer, that if these two Humours are compar'd, while the *Fætus* is very small, there is, I do confess, a very near resemblance. At this time whatever is contain'd within the *Chorion*, both the *Embryo* it self, and also the circumambient Liquors are all a jelly: But if you examine them towards the latter time of Gravitation, which is by all that do
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assert this Opinion, allow'd to be the most probable, when the *Fætus* is nourished at the Mouth; you will hardly find two Liquors more different. That in the Stomach is still of a viscous, ropy consistence; and what is contain'd in the *Amnios*, extreamly fluid. The first if you boil after a little spumation, like the *Saliva*, to which it is very near of kin, indurates like the White of an Egg: The other, upon boiling, entirely evaporates and leaves nothing but a *calx* behind, as was before mention'd. The tastes also are extremely unlike, and that shall be sufficient for an Answer to this,

Thirdly, The Females licking their respective Offsprings as soon as born, is, in the Opinion of many, an Argument sufficient to induce us to think, that the Liquors in which they swim in the Womb, and which stick to them upon the Birth, are of some sweet and agreeable Taste; that this tempts these Creatures so greedily to devour it; and therefore conclude it of a fit quality for the Nourishment of the *Fætus* before 'tis born.

How this compassionate and kind of parental Tenderness in Brutes came to be thus accounted for, has been matter of wonder to me frequently; for, as has been before hinted, it does not appear that it is of so desirable a taste as to tempt them to it. Was it ever supposed that Dogs, and some other Animals,

nimals, often licking their Sores, Ulcers, Wounds, &c. arises from the pleasant taste of what is discharg'd at them? Or is it not more Physiological to allow them such a share of Reason, Self-love, Instinct, or what else it may be called, towards themselves, as that they know the use of it? And we find the consequence agreeable to the Design. Besides, if this be any Reason, it ought to be the general Practice of all Animals, Brutes at least: Now as we find not the least inclination towards it amongst Human, so do we find that it is not general in Brutes; for instance, Sows, amongst the Porcine *Species*, never can be observ'd to do it, which one exception is sufficiently destructive of the Argument. This licking therefore of their young, is suggested to some of them by Nature, from nothing else but a commiserating pity to their poor helpless Offspring, and licking them dry from Instinct, or a Sense that they ought to be kept dry and warm at their first coming into the World. And that I might confirm this by an Experiment, I took from a Bitch that had newly whelp'd, all her Puppies, except one, and drowned them. That which remain'd (after some little time that her concern for the other was over) I dipp'd into warm Water, and put it to her Dam, which with a most sensible tenderness lick'd it dry. This is sufficient to shew from what instigations this Action arose; for sure it will not be said, that
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the Animal did it from a desire of the Water only. But I carried the Experiment farther, and took a day after, the same Whelp, and dipp'd it into a pretty warm and strong infusion of *Carduus Benedictus*. This succeeded also according to my expectation, for the Bitch again lick'd it with a kind of murmuring *Loquela*; and which is observable, shew'd very frequently an utter dislike to the taste. This is an Experiment which any one may make at any time. And when so many excellent Anatomists and Naturalists, both ancient and modern, have allow'd to the brutal part of Animals many degrees of Reason; and their care of their young, in order to perpetuate their *Species*, is exemplified in a thousand various and amazing instances; I think I never met with any thing so merely and literally superficial and unphilosophical as the present Argument, and therefore think it not worth time to say more of it.

Fourthly, Another Argument made use of to persuade us that the *Fœtus in Utero* is nourished at the Mouth, is, that swimming in so copious a Liquor, and sometimes opening its Mouth, some of the Liquor must get in, and consequently the *Embryo* put upon a necessity of swallowing, &c. to confirm which, we find that the Chick in the time of Incubation, or Hatching, especially at first being nourished by the albuminous Liquor of the Egg,

Egg, is produced as an instance not to be denied: This is very much insisted on by *Dr. Harvey*. The first part of this Argument, (*viz.*) the opening of the Mouth of the *Fætus* whilst it is in the Womb, is not only precarious, in as much as it is impossible to discover it materially, but false to demonstration; For the Lips of all Animals are so closely shut, that before the time of their Birth it is as difficult to open them, as their Eyes or Nostrils. And if we consider it as an Action, 'tis much easier for the *Embryo's* of all Animals to keep their Mouths shut, than their Nostrils, because the Lips of many Animals meet in a parallel Line; and of several, the upper Lip shuts over the under, as one might reasonably suppose for the greater security, to prevent any thing entering at it while it is in the Womb. On the contrary, the Nostrils of the *Embryo's* of Cows, Sheep, and many others, are closed by drawing the upper part downwards into the middle of the lower, and so forming a kind of Greek circumflex after this manner [~]. These considerations perhaps have induced an illustrious Anatomist of the present Age in *France* to account for the Contents in the Stomach and Guts, by asserting, that the Liquors of the *Amnios* pass that way into the *Gula* and *OEsophagus*, and so on. But this is attended with many unsurmountable difficulties; and which I could contradict by several incontestable Experiments, which I
hope

hope I may have time to do hereafter, though here I have neither space nor opportunity. To go on, I have frequently observed that on the Birth of several Creatures, the first opening of the Mouth is perform'd with a seeming difficulty, with a spring and kind of spasm; which surely could never be, had they been so constantly practising it before.

As to the instance of the Chick, I must take leave entirely and positively to deny it; and of which I shall give so plain a Demonstration, that any Person may make himself a Judge. Ever since the time of the great *Harvey* it has been allow'd, that the little orbicular spot affix'd to the *Vitellus*, is the place where the first Rudiments of the *Embryo* appear, and for the sake of which, as that learned Man has undeniably observ'd, all the rest of the Egg is form'd. This is so closely united to the Yolk by means of its Membrane, that 'tis impossible to separate it without breaking the Membrane of the Yolk, and consequently spoiling the whole intention and design of Nature; but the White falls from it with all the ease imaginable; so that with a little Cotten you may wipe its exterior Membrane quite dry; and if after this you observe it through a magnifying Glass, there is no discovering any passage of communication; this is sufficient to shew, that there is no communication between the White and *Cicatricula* before the Incubation. To proceed, if we

make our observation according to *Harvey* in his fourteenth and fifteenth Exercitation ; after some time of the Hens sitting upon the Egg, we find the *Cicatricula* enlarged, and some part of the *Embryo* even visible ; still this Membrane that separates it from the White is coextended with it, and the White falls from it without the least sign of Adhesion, and still is as inseparably united to the Yolk ; and so indeed the *Fætus* remains to the time of its exclusion, and for some time after. Now as it is an infallible Maxim in Nature, that there can be no animal Augmentation without Nutrition ; *Nam nutriri, & augeri idem est* ; this is a Demonstration, that the first is imparted to the *Embryo* from the Yolk : And for the last all Naturalists agree, and it is demonstrable to Sense, that the Nutrition of the Chick for many days before the exclusion, and for some time after, is wholly and entirely from the Yolk. This being so, there is no space of time left for the Nutrition of the *Fætus* of any *Species* of Fowl by the albuminous Liquor, but the intermediate of these two. And why Nature which is so simple, uniform, and consonant in all her Actions, should thus change Hands, and vary her operations without necessity ; when 'tis proved as above, that the Yolk is a Magazine, from whence may be drawn a Nutriment fitted for the *Embryo* in its most tender and weak Condition, as well as when it is more strong and robust,

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I shall leave to others to make out ; contenting my self with having given the Reader an account (which I hope is satisfactory) of the first and the last ; from whence it will be no begging the Question to conclude, that the *Embryo* receives not its Nourishment at any time at the Mouth, during its abode in this Mansion.

The *fifth* and last Argument I shall mention, is, by Authors drawn from the Contents within the Stomach and the Intestines, which is by all those that have writ upon the Subject insisted on as a Matter of Fact and Demonstration. Not that it absolutely proves the entrance of the Liquors in at the Mouth of the *Fœtus* ; but this being the constant method of Nature during the animal Life ; and the Offices of Digestion and Chylification, namely, the Stomach and small Intestines being possessed with a material *Pabulum* fit for such a Function ; and the greater with visible Excrements, as the *rejectanea* of Nature subsequent to such an operation ; they thought they could not satisfy their Readers (to whom they found themselves of necessity accountable for so considerable a *Phænomenon*) with a more probable, or even demonstrative *Rationale*, than that as there were certainly those Offices perform'd by what visibly appear'd ; and that there was no passage but at the Mouth into these places ; and that nothing lay ready

or near the entrance, but the Liquors with which the *Fætus* was so plentifully encompassed; they must unanimously conclude, as Dr. *Harvey* did in the place before quoted. To which I shall only make this Reply at present; that as this must be confessed to be a Matter of Fact, and consequently admits of no other answer, but the proving other ways and passages, and that demonstrably for the aliments to take, exclusive of the entrance at the Mouth, as describ'd by the learned Dr. *Harvey* and his Followers; so I contend, That the Assertion is not founded upon the anatomical Demonstration of the Parts; but only upon strong Presumptions and probable Conclusions, that things must be so, because of the consequences observable upon them: And this is not a direct account or *Rationale*; only something like a *causa sine quâ non*.

C H A P. IX.

The Author's Opinion concerning the Nutrition of the Fœtus proved first negatively by three remarkable Histories.

HAVING in the foregoing Chapter transiently examin'd what is chiefly insisted on by the Anatomists, who have undertaken to write on this Subject (not but that there are many other Speculations on it to be found up and down in Authors). I shall now proceed to shew, what I think is the true Method of Nature in the Nutrition of the *Fœtus in Utero*; and that according to my promise before, *First*, Negatively, that it is neither with the Liquors contain'd in the *Amnios*, nor by the Mouth, as described by Anatomists and Physicians hitherto. And then, *Secondly*, Positively by shewing, that the *Materia Nutricatûs* is imparted from the Mother in *viviparis*, by the umbilical Vessels, which I shall trace so far, as to make it plain that all our doubts are easily resolvable, upon the discovery of the Vessels, together with some uses and Offices of them, not yet (that I have met withal) perfectly known.

And first for the Negative part, I shall produce some instances which undeniably and demonstrably exclude the Mouth from having any part or share of Action in the Nutrition of the *Fætus*; and these are of two Monsters which have been produced perfect in all other respects, but without a Mouth, and one without a Head.

The general Objection which will be made to this I know is, that peculiar instances and Deviations of Nature are not to be regarded as matters of Proof; that where Nature is forced out of her way, we are not to follow her; for she herself being mistaken, whatever is founded upon such observations must be erroneous too.

To this I answer, that where two Offices in the natural œconomy are disputed almost in an *Æquilibrium*; and one of them withdrawn or entirely suspended, and the other shall be found to be able to supply all the Offices of Nutrition, Accretion, and Augmentation by it self, and all the Parts (but the excepted) perfect: This will certainly encline us to attribute a greater share of Action and Ability to this, than to that; especially when we consider that nothing has ever been perform'd in any tolerable degree of what may be called natural, upon the want or defect of one, when it has been of the other: To be plain, it will appear that Nature has brought the *Fætus* of some Animals to a degree of perfection

perfection in all other Parts, without the assistance of Head or Mouth; but never without the umbilical Vessels, which I challenge the whole History of Physick to contradict. And that this Assertion may not seem self-sufficient, or too assuming, before I produce the Instances, I shall make use of that Prefatory Aphorism of the celebrated *Malpighius*, which he prefixes to his learned Dissertation *de Polypo Cordis*.

“ *Morbosas constitutiones quas Naturæ*
 “ *ludentis, vel vimorbi aberrantis frequen-*
 “ *ter in animalium corporibus excitatas mira-*
 “ *mur, plurimum lucis prorimandâ ejusdem*
 “ *genuinâ operandi normâ, & methodo, con-*
 “ *ferre perpetuò credidi: quandam enim ma-*
 “ *teriæ necessitatem, & determinatam incli-*
 “ *nationem demonstrant, quæ in compingen-*
 “ *dâ animalium mole elucescit; ita ut Mon-*
 “ *stra, cæterique errores faciliùs, & tutiùs*
 “ *nostram erudiant insipientiam, quàm per-*
 “ *politæ naturæ machinæ: Hinc plura di-*
 “ *dicit præsens hoc seculum, insecta, pisces,*
 “ *primaque & rudia nascentium animalium*
 “ *stamina lustrans, quàm anteaetæ prisco-*
 “ *rum ætates, circa sola perfectorum cor-*
 “ *pore sollicitæ.*

The Opinion of this learned Author is so full, and direct to our present enquiry, that indeed it was the chief encouragement for the publishing my Thoughts on this Subject.

Theodorus Schenckius, in his *Schola Partium* has something like this, pag. 37. and is particular on the part.

“ *An os apertum fœtus habeat ultimis*
 “ *mensibus in utero adhuc delitescens, asse-*
 “ *ritur ab his qui puerum cum Empedocle*
 “ *& Democrito ore sugere alimentum, tam*
 “ *constanter aliis persuadere conantur. Sed*
 “ *cum fœtus in lucem editi, clauso, & jam*
 “ *vel planè nullo oris vestigio adparente, nati*
 “ *legantur; innuant illi mihi quæso unde*
 “ *ejusmodi natis nutritio accesserit; siqui-*
 “ *dem quod & πᾶντος esse debet neque hic*
 “ *deesse debebat.*

The Judgment of these two learned Authors, who have so well deserved of the Republick of Physick, is a very fair Introduction to the three remarkable Instances I am now producing.

I. The *first* is no more than a Quotation, but remarkable in respect of the Author, and the Circumstances of the Production it self.

It is from the celebrated *Ambrose Pary*, who in his 24th Book *de Monstris & Prodigis*, pag. 553. gives us the following Relation.

“ *Ann. Dom. 1562. Calendis Novembris,*
 “ *Villæ Francæ, in vasconiâ natum est, quod*
 “ *hic appictum vides monstrum, fœmina Ace-*
 “ *phalon, cujus imaginem à Fontano Agenensi*
 “ *medico, qui se id vidisse sanctè affirmabat,*
 “ *acceptam*

“ *acceptam mihi hanc de monstris commen-*
 “ *tationem paranti obtulit Johannes Altinus*
 “ *Doctor Medicus.*

Pary indeed makes no observations on this extraordinary Occurrence, in regard to our present purpose; but as it sufficiently appears by the *Cutts* there, (and which for the reader application I have transfer'd hither) here are neither Mouth, nor Lips, nor any entrance but by the umbilical Vessels; and yet we have no reason, but to think all the rest of the Body, both internal, as well as external, perfect, except the defect of the Head.

2. The second Instance I shall give, by which the Liquors contain'd in the *Amnios* are in my Opinion excluded from being capable of Nourishment; is of a Person living about seventeen Miles from *London*; an account of which I receiv'd from the Physician (on whose truth I can depend) who was concern'd both for the Woman and her Husband; they both labour'd under a virulent *Gonorrhœa*, the Woman at the same time being with Child. How the Disease was contracted, is not to our present purpose; however, by proper applications, they were both cured a very little time before the Woman was deliver'd. The Physician, who was curious to know the circumstances of her Delivery, was inform'd by the Midwife, and several other Women then present, that when the Waters broke,

broke, there was a stench so offensive that some could scarce endure the Room ; and the Midwife assur'd him, upon the Question, that it was the Waters from whence that ill smell arose : Notwithstanding this, the Child, which is a Girl, and still living, was born well and healthy. The Membranes of the secundine were very tender, and almost rotten. As I am well assured that this Relation is true in Fact, I desire any one to account, how it can be imagin'd, that this Child could live upon such a Food as these Waters ; or how it was possible, if it should have receiv'd any into its Stomach, that they should not contaminate the tender *viscera*, so as to have destroyed the *Fœtus*. It is almost miraculous to conceive how the Child should be preserv'd from corruption, when so long encompass'd in such a collected Mass of Fœtid Liquors : But those that are concern'd in Midwifry know, that it is not very uncommon for the Waters, Membranes, and *Placenta*, to be somewhat thus affected (though seldom to so great a degree) in Persons of the strictest Virtue ; which one consideration alone is enough to make any thinking Naturalist stagger in his Opinion, how such Liquors should be Nutritive.

3. The *third* and last instance I shall produce, is of a monstrous Pig brought forth some time ago, the account of which take as follows. I was sent for one Morning to see a
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monstrous production of a Pig, (the Dam of which was in the possession of one *Peregrine Pope*, the Man and his Wife are both still living in *Stamford*, and ready to attest the truth of the Relation) where I found one of the oddest appearances of deviated Nature, that yet I ever saw; a Pig with an Head in many parts like an Elephant; the Ears broad, and lying flat to the Head, and exactly of the form of those of an Elephant; from each Ear ran a Cartilaginous hard Substance under the Throat, the ends of which were closely united to the bottom of each Ear. The Head ran out into a length considerably longer than the snout of other Pigs, in the form of a *Proboscis*, but not flexible; at the end of which were two small holes stopp'd up with two Pellets of a dry Substance, like the dried *Mucus* of the Nose, such as I have frequently observed to be in the Nostrils of young Creatures when first born: The whole was invested with the hairy Membrane, and not the least appearance of a Mouth. I carefully enquir'd of the Woman, who assured me that it came forth alive and moved, but very soon dyed, as must be imagin'd. As to its size, upon comparing, it rather exceeded in bigness the rest of the Litter.

There was another part observable only for its curiosity, the End or Toe of each Hoof turn'd up in the form of a very curious curl, and this was the same on all its Feet.

Feet. Having satisfied my self in what Questions I thought fit to ask, I bought the Creature of the Woman, and sent it home in order to examine it more exactly; for it immediately brought into my mind this controverted Point, concerning the Nourishment of the *Fœtus in utero*. When I came home, and had again admir'd its outward form, I began to examine its internals, by opening first the *Abdomen*, where every thing was perfect and natural; and what I chiefly aim'd at, found the Stomach and Guts full of the usual contents. This was an irresistible Demonstration, that this Creature receiv'd Nourishment sufficiently, as other *Embryo's*; but totally excluded its entrance at the Lips, and consequently the *Humores uteri* could be no part of the matter of its Nourishment. This being so, I found my self at liberty to enquire into the progress of the umbilical Vessels, by which alone the Nourishment could be conveyed. After having traced the Vein to the Liver, and carefully examin'd what I could there, I found the capillary Branches which it communicated to that *Viscus*, were of small consequence; though perhaps the Blood may deposite some of its bilious acrimonious Particles there. But following the umbilical Vein farther, I found the communication learned *Harvey* speaks of in his 52^d Exercitation: So that the use of the Liver in what regards the umbilical Vein, and the Nutrition of the *Fœtus*,
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is chiefly to strengthen and support it in its Passage. Having thus follow'd it to the right Ventricle of the Heart, I was forced to content my self with viewing the common Passages of the Blood, as it passes those Offices in a *Fœtus* describ'd by our famous Dr. *Lower*, in his celebrated Book *de Corde*, and others, which I wave quoting, because very numerous, and now generally known; but cannot omit setting down what is said by *Theod. Schenkius* before mention'd, being more directly to our purpose. After having describ'd the journey of the Blood in Adults from the right Ventricle of the Heart through the Lungs, and back again through its proper Conduits to the left Ventricle; he comes to speak of the different Passage of the Blood in a *Fœtus*, in these words.

“ *In fœtu tantâ itineris ambage non*
 “ *utitur natura, quæ sanguinem & chy-*
 “ *lum maternum per foramen ovale ex au-*
 “ *riculâ dextrâ in sinistrum ventriculum*
 “ *eructat, &c.*

I found my self here at a stand, and considering the Parts attentively, and also comparatively with those of an Adult, I could not apprehend that any thing offer'd it self so readily as the Gland *Thymus*, to which I could directly apply my self. For this being of a very considerable magnitude in the *Fœtus* of all Animals, and even so too when the *Embryo* is very small: And finding also that all

Anatomists in describing it, and assigning its use, attributed to it some peculiar Service which it perform'd in the *Fætus*; I bent my thought chiefly upon that. However, I could proceed no farther with my little Monster at this time, and contented my self with the assurance of the *Fætus* receiving its Nutriment from the Mother by means of the umbilical Vessels, and no way else.

These three Instances well weigh'd, I hope are sufficient to exclude the supposal of any Nutriment passing in at the Lips of the *Fætus in utero*; in which it is a very great satisfaction that I am not quite alone, but have the Doubtings, and in some measure the Opinion of no inconsiderable Authors to support me.



C H A P. X.

The Analogy between the albuminous part of an Egg, and the Humores uteri, examin'd, and the true use assign'd.

HAVING by these three Historical and extraordinary cases last mention'd, excluded the *Humores uteri* from being any part of the *Materia Nutricatûs* to the *Fætus*; it will fall in most aptly here, to discourse on the Analogy between them, and the albuminous
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part of the Eggs of Fowls, which I before engag'd to do, and in consequence to shew the true use of them both.

That there is such an Analogy and Resemblance is generally allow'd; but the correspondence in all particulars can hardly be made appear: For instance, one use of the Liquors of the Womb in viviparous Animals, is acknowledg'd on all hands to be to preserve the *Fœtus* from any Injury, while the Mother runs, leaps, coughs, or uses any other violent Exercise; but there is no such use to be assign'd to the White of an Egg; it being intended by Nature to be ever in a constant *requies* from its exclusion from the Hen, to the exclusion of the Chick from it; which Dr. H. More takes peculiar notice of, as a most admirable contrivance of Providence.

Secondly, I have said perhaps enough already concerning the nutritive quality of the *Humores uteri*, but shall take leave to add upon the Analogy in this place, that as they are exactly alike, especially (if compar'd) at the first time of Conception in Taste and Consistence; so are they of no different use in regard to Nutrition: The insipid Taste of both of them does, in some measure, declare the few nutritive Particles that are in either; so that Holy *Job* expostulates with some vehemence, *Is there any taste in the White of an Egg?* And indeed if we consider that all alimentary Bodies are subject to a putrid Corruption,

tion ; and at the same time how greatly the two parts of an Egg, the Yolk and the White, differ in this one respect ; the first contracting like other Aliments, by long keeping, so strong and stercoraceous a smell, that it outstinks the human *Carbo* : While the White remains tasteless and insipid almost as at the first ; except the taint it may have contracted from the included Yolk ; hence we have a pretty strong inducement to make us think, that neither of them are intended for that use.

The true use therefore of the *Humores uteri*, and the *Albumen* of the Egg, is to be as a soft *Pulvinar* unto, and upon which the *Embryo* may stretch and extend its tender Limbs : And in this comparison they bear an exact Analogy with each other. At first they are soft and mucilaginous, as being certainly best for so tender a Being to be encompassed, confin'd, and as it were cloathed withal. Afterwards, as the Limbs of the *Fætus* grow larger and stronger, these natural *Gossypia* gradually lose their Velvet like tenacity, and become more thin ; and as Dr. *Harvey* observes, as the Parts approach they grow more fluid. This, and the defence and protection from Injury before mention'd, I take to be the true use both of the White of the Egg, and Liquors of the Womb. *Sed meliores dicant meliora.*

C H A P. XI.

The Affirmative part, in which is discover'd the use of the Gland Thymus, together with the course of the alimentary Liquor, to the Mouth of the Foetus.

TO return therefore now to our enquiry, how the nutritious juices are conveyed to the Stomach and Intestines, which is the affirmative part propos'd. Having carried the disquisition on the Subject as far as the Heart in that Pig monster before describ'd, and finding the Gland *Thymus* present it self in so considerable a manner, both in regard to its Magnitude and Office: I consulted some of the most considerable Authors, in order to find out the Use and Office assign'd to it, or suppos'd. What had been said before our learned Dr. *Wharton* published his excellent Treatise of the Glands, seems to be all *Gratis Dictum*. And although I think he has not found out the right use of it, yet has he examin'd it so far, as gave me great light and encouragement to prosecute my first Conceptions. See that Author's account of it in his *Adenographia*, Cap. xvi. pag. 102. where, besides his accurate description, he presents his Reader

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with a very curious Cut Plate of the *Thymus* of a Calf, and its processes from the Region of the Heart up to the maxillar Glands. “ *Quibus ita contigui sunt ut iisdem continuos esse diceres.* Upon this encouragement I proceeded to examine the Nature of this Gland in the earliest formation of it; and found it, especially in Calves and Lambs, which were what I could with most ease obtain, very considerable, in respect to the bigness of the *Embryo*; and in that of a Calf, about six Weeks after Conception, it is of a diaphanous appearance (as indeed is the whole Creature almost at that Age) and exhibits a very curious and easily perceptible texture.

At this time we may distinctly observe, the conglomeration of its Glandules: For the *Parenchymatose* Substance not being grown crasse enough to hinder the light from passing through it, you may easily discover infinite numbers of little globular Bodies, hang as it were upon stalks, which proceed towards the Centre, where the excretory Duct, or rather the common Receptacle of the chylous Liquor is form'd; very much like the description *Malpighius* gives of the Kidneys of a Bear, *Appensa quasi cerasorum congeries videtur*, like little Cherries tied into a Bunch by their Stalks. These Stalks all visibly tend towards the Receptacle, or its two Processes; which run up on each side of the *Trachea*, till they

come up to the maxillar Glands with whom they unite, and with whose salival Ducts they communicate. I have often wonder'd how so accurate and diligent an observer as Dr. *Wharton*, should not be able to find out the *Pelvis* or *Receptaculum* of this Gland. However, Monsieur *Dionis*, Dr. *Drake*, and others, have discover'd and describ'd it, and it is very easily discernible in a large *Fætus*, especially before the Birth, with greater facility, than in those that bleed to death under the Hands of the Butcher. I suppose because the Blood being discharg'd from the Jugulars, and so near the situation, all the adjacent Vessels must consequently be more deplete than in other remote parts; and therefore the *Thymick* Vessels contract and become difficult to trace. The same difficulty is observ'd to be in finding out the Thoracick Duct in Animals, that have been long fasting. This gave occasion to Dr. *Wharton* to assign a very odd use to this Gland, namely, that the Nerves of the *Par vagum* should here discharge themselves of some acrimonious impurity, which is carried away by the Lymphæducts of this Gland; and that some very fine Liquor is taken from it by the Nerves, that arise from the subclavian *Plexus*, for the use of all the nervous Parts of the Body; which is mere *Hypothesis*, and so that Author leaves it. Dr. *Tyson* and others after him, suppose the *Thymus* to be for a *Diverticulum* to the Chyle, and

to intercept in some measure the course of it, from its Lymphaticks communicating both with the Thoracick and the subclavian Vein. For what Reason that excellent Anatomist Dr. *Kiel* should call the *Thymus* a conglobate Gland, I cannot imagine; when, as Dr. *Wharton* observes, comparing it with the *Pancreas*; *Est enim ex multis similiter globulis vel frustulis conflata*; and, as I before mention'd, its compage is discernible by the naked Eye, in the early *Embryo's* of Animals, to consist of several globules united by a proper *Parenchymatose* substance, whose Necks or Stalks empty themselves into a common *Pelvis*, and all invested by a common Membrane.

Monfieur *Dionis* comes the nearest to its use of any that I have met withal, *viz.* that it serves to separate a chylous and milky Liquor in the *Fætus*, which is afterwards poured into the subclavian Vein; and supplies the place of the chyle, which the subclavian Vein receives from the Thoracick Duct, as soon as the *Fætus* is brought into the World. So that this Gland being only serviceable to a *Fætus*, ought (as that Author thinks) to be drawn up in the same class with the umbilical Vessels.

C H A P. XII.

*The Course of the Alimentary Ducts farther
consider'd and demonstrated.*

NOT to run a Circle in refuting every single Opinion, I shall give the Reader the true use of this Gland, so far as I have been able to discover it; and how and in what manner it serves to the Nutrition of the *Fætus in Utero*; by separating the chylous milky Parts, which *Sckenkius* calls the *Cibus Mâternus*, brought along with the Blood which serves as a vehicle to it.

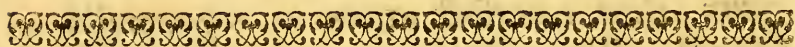
And first, I think it incumbent on me to demonstrate, the communication the Vessels of this Gland have with those of the maxillar Glands, and so forward into the Mouth. To make which plain, you may make the following easy Experiment. First lay the Gland bare, by removing the teguments and all the adjacent Parts, so that you may come at the *Thymus* to compress it. Then tying both the Branch of the carotide Artery, and of the jugular Vein, which enter and return from it; after this take a Linen Cloth four or five times double, and dip it in pretty hot Water; then wrap the Gland in it, and first gently

compressing it, you will presently see the maxillar Glands grow Turgid; and still continuing pressing it in your Hand, you may observe the nutritious Lymph, in the form of a limpid Salive, come in great quantity into the Mouth. Which Experiment I take to be sufficient demonstration of the communication, and course of its Vessels, and also of its Use and Office. Besides this Experiment, there is observable in Children newly born, when they sleep, as well as when they are awake, a kind of Manducation, which our Women call a sort of sucking, but is nothing else than a natural Motion for the encouragement of this nutritious salive to come into the Mouth; and it is worth remarking, that they do this not continually, but *repetitis vicibus*, that they may swallow what is thus brought into the Mouth. Let any one but endeavour to imitate this motion, and keep his Lips shut, and he will immediately find his Mouth full of Spittle.

Having thus discovered the communication of the Vessels of the *Thymus* with the salival Ducts: I shall not go about to deny, but that it may also have some communication with the *Ductus Thoracicus*, according to Mr. Cowper and others; and also with the subclavian Vein, according to Monsieur *Dionis*. It is sufficient for my purpose, to have discover'd this communication and use of the Gland *Thymus*, not mention'd that I know of

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by any one yet. The Use and Office of this Gland is not immediately suspended upon the Birth of a Child, but is continued, and is of great Use and Service, both to separate the greater quantity of Pituit from the Blood which Infants abound with, and which we daily observe in healthy Children by their flaving; and also to dilute the Food in their Stomachs, that the curd of the Milk, or what other Food they take, may be the more easily digested and dissolved; and furthermore, serves as a proper vehicle to the Chyle and Blood.



C H A P. XIII.

A Summary of the whole, being one entire view of the Nutrition of the Fœtus.

TO draw near towards a Conclusion, and without farther repetition, to give the Reader one general and entire view of what is intended by this Discourse; namely, *the Nutrition of the Fœtus*. Having, I think, given sufficient Reasons to exclude the Reception of any aliment at the Mouth, during its abode in the Womb, (with Submission to better Judgments and future Discovery) the whole

Affair from the beginning to the end is perform'd after the following manner. The Male Seed being full of the *Animalcula*, or Seedlings of the *Respective Species*, to whom the gelatinous part of the *Genitura* serves both as a *vas* and *vehiculum*; being in Coition injected into the Womb, and thereby the warmth and gentle compression of the Parts dissolved, and the *Animalcules* set at liberty, some one or more of them ascend the *Fallopian Tubes*, and there are affix'd to the *Ova* in the Female Testicles (which I rather take to be a sort of *Vitelli*, analogous to the Yolks of the Eggs of Fowl, whose origination is in the *vitellarium*, than a perfect *ovum* as is generally asserted). The *vitellus* or *ovum* thus affected, which may be called impregnation, grows Turgid; upon which, becoming too big to be contain'd in its *Alveolus*, it is disengaged from it and discharged, and thus they descend and repass the Tube, and are receiv'd in the Womb by a mucilaginous Matter prepar'd by Nature for it.

Upon this is form'd an *oviforme quoddam* according to *Hippocrates*, and the accurate Inspections of *Regnerus de Graaf*. This is the first Stage, and here the *Animalcule* is extended, and its Parts as it were unfolded, and like the Seeds of Beans, Pease, or other vegetables in the *Matrix* of the Earth, or the *Embryo's* in the Eggs of Fowl, is nourished

rished *in viviparis*, till the Branches of the umbilical Vessels, like the Roots of Vegetables, extend themselves through the *Cortex* of this Egg-like Substance; and then creeping as it were along the sides of the Womb, they there meet with the capillary Branches of the Hypogastrick Arteries, which by the venereal Action are render'd turgid and full of Blood; with which they are implicated and unite by the mediation of that glandular Body the *Placenta*. By means of this Gland, (as in most other glandular Secretions) the Branches of the Mother's Arteries being dispersed throughout its *Parenchyma*; there is segregated likewise a chylous milky Liquor, which, together with the Blood, being receiv'd by the Branches of the umbilical Vein, is by it collected into one Trunk, and carried to the Liver, and from thence into the Right Ventricle of the Heart; and as is before related through the *Foramen ovale* into the left Ventricle, from hence by the Pulse of this Machine, good part of it is thrown into the Carotide Artery, a large Branch of which enters the *Thymus*, and in this Gland the Blood unloads its self of its chylous milky Juice; which being carried up to the maxillar Glands by the two forked Branches of the *Thymus*, is there discharged into the salival Ducts, which forthwith carry it into the Mouth of the *Fætus*. In this Action the *Fætus*, when it is strong enough to move the lower
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Jaw, assists by the manducation before mention'd, and the posture in which it generally lies in the Womb, which is with its Head declining towards its Breast, contributes not a little to it.

The Nutriment being thus brought to the Mouth, its descent into the Stomach will be very easily accounted for. This slimy salive in the Mouth of Whelps being very like, and indeed the same with that in the Stomach, has been the Reason, that has carried so many famous Anatomists into the Error of asserting, that the Liquors in the *Amnios* enter'd at the Lips of the *Fætus*; and especially *Bartholine* and *Rudbeckius*, who finding a great quantity of mucilaginous slime in the Mouths of Whelps, and not knowing from whence it came, comparing it at the same time both with what they found in the Stomach, and also with the Contents in the *Amnios*; and finding them in many respects alike, concluded that it must enter at the Mouth, and into it from the *Amnios*, as lying next to it.

It is more than probable, that this alimentary Lymph thus brought to the Mouth of the *Fætus*, in the earlier days after Conception, passes into the Stomach without the Action of Deglutition; for the Lips being exactly closed, and the *Aspera Arteria* and every other part which belongs to Respiration, lying flat and without Action till the *Partus*, the *Oesophagus* may lie open for the entrance of the alimentary Lymph to descend into the Stomach.

Stomach. Being got hither, here begins the Chylification, which indeed requires but very little elaborating; having passed the Offices of Digestion and other Cribations before in the Mother; being receiv'd afterwards into the *Duodenum*, there it meets with the Bile and Pancreatick Juices, which being in those tender *Primordia* of a very mild and benign Nature, the Chyle is soon form'd; and so enters the lacteal Veins, leaving behind it some *Rejectamentum*, but so small, that the *Intestina Crassa* are able to contain it for almost nine Months together, and in some Animals longer; this is called *Papaver*, or *Meconium*.

As there is a constant supply of nutrimental Liquor dispensed from the Mother to the *Fætus*, so is there a proportionate return made by the umbilical Arteries from the *Fætus* back again to the Mother in an uninterrupted course of Circulation; so that during the time of Gravitation, we are not to look upon the *Fætus*, as a distinct being from the Mother, but either in an Analogy, as the Fruit of a Tree or Vegetable; or in a natural or animal Notion, as a very part of the Mother: The same Nutriment, the same Blood, &c. serving for the support of both. The umbilical Arteries that return the Blood to the *Placenta*, arise just at the Bifurcation of the *Aorta*, or where the Iliacs begin; and the Curve, or almost Oval Figure the Child lies in in the Womb,

Womb, and its Back being round, these Arteries lie much more ready for the reception of the Blood as it descends the great Artery ; besides, that this kind of Posture presses the Iliacks, and intercepts the course of the Blood by almost forming a valve, so that the more fluid part of the Blood passes only into the Iliacks, whilst the more gross, and far the greatest quantity, returns by the umbilicals to the *Placenta*. From hence we may justly make this observation, that the *Fœtus* is certainly in a far greater measure nourished from the Juices subsequent of its own Digestion, though the maternal Blood and Lymph may be, and is hereby proved to be the great *Penu*. For if we come to compare and consider, that what is carried by the umbilical Vein to the *Fœtus*, is by a very slow motion, and what is return'd by the Arteries, is with the Force and Spring of a Pulse ; it will be found that it can't differ a great deal even in quantity ; although the two Arteries may not be so big in their *Diameter* by some degrees, as that of the Vein. Every one knows that the *Dimension* of the *Aorta* is not so capacious as that of the *vena Cava*, by one fourth part at least ; and yet it is allow'd, that thrice the quantity of Blood, by means of the Pulse, must pass the first as the last. But of this enough.

Thus have I given a short account of the Nutrition of the *Fœtus* in the Womb ; in some parts demonstrably true ; and reasonable
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I hope in others; but dare not say it is exact, neither have I indeed said all I could, and had collected for that purpose. This is for the first enough, perhaps too much, which I offer to the censure of every candid Physiologist, with all the Submission imaginable.



APPEN-



APPENDIX

De Cibo Infantum.

Or some short Reflections on the Food of Infants.



HAVING in the foregoing sheets said so much concerning the Nourishment of the Child in the Womb, it may not be amiss to carry our Thoughts a little farther, and consider the Nourishment it meets with, when it comes first into the World: In which the Errors are as great in Practice, as they are before the Birth in Speculation, and much more unreasonable and mischievous. What the Dictates of Nature are in this Affair, is obvious to every one; the Milk in the Breasts is what is assign'd by that provident Oeconomist,

milk, as the only proper Food for all the young of these Animals which are so furnished. And to do the Faculty Justice, there is not any Physician that has writ well upon the Subject, but has constantly advised the following this Lesson of Nature, and condemn'd the contrary Practice. But notwithstanding all this, we see the Error so universal, that from the Princess to the Peasant's Wife, we find Nature, as well as Reason, contradicted. A strange and general mistake is got into the Heads of all Women, especially the wise Nurses and Midwives, that what is in the Breasts of the Mother, immediately after the Birth, is of some lowre or impure quality, and not fit for the Child she has brought forth to be nourished withal; when it ought to be observed, that at that time the Milk being of a thin and of a ferous Disposition, is so order'd by the admirable contrivance of Nature, that it may be of a cleansing and somewhat cathartick and purging quality, to cleanse the Intestines from the black *Meconium* and other natural Impurities, that have been detain'd there for many Months. It is confessed by all, that Milk is of it self of the most benign kind to the Child, and its admirable use is too well known in all tabid and consumptive Cases, to need here any praise or defence. But let us see what is thus wisely substituted in its place, to avoid this visionary mischief of the Milk. As soon as the Child is born, one advises Claret, another

ther Sugar, Nutmeg, and Butter, to prevent wind, according to the common cant; another, some distill'd Waters, Powder of Ani-seeds, Caraways, Rhubarb; nay, I have known some so abandon'd of common Sense, that they have given a Child just born juice of Rue, Periwinkle, and such like poysonous Juices, to prevent Fits, forsooth. This I saw my self some Years ago fatally experimented by an old Woman, who had got such an Ascendent in a Family, that *maugre* all perswasions, and even a manifest sensibility, that the Child (who was born healthy enough) grew worse upon the taking of Juice of Periwinkle; pursued her inveterate stupidity to that degree; that the very Juice came visibly from the poor Infant unalter'd in its Stools, and at last expir'd in the taking it. 'Tis impossible with patience to reflect on these mad Proceedings, by which many a dear helpless Infant has been hurry'd out of the World from the Arms of its melancholy Parents; and perhaps a Noble Family extinct by such horrid Measures, and the ignorant Murtheress thank'd and paid for her Pains.

Certainly Nature and Providence must be not only defective, but mistaken in thus lamely providing for the support of the Offspring of Mankind (which is an accusation as foolish as it is impious); or these People must be wretchedly in the wrong. For let us but expostulate a little, and guide our selves by
common

common sense, and we must think so. Can any thing in Nature, that is but Alimentary, be more different, than these strange mixtures are from Milk? But to make these our Observations of some use, let us examine the most innocent of these proceedings, and see if they can be justified by Reason, Physick, or Nature. And to put them into a kind of method, we will speak of them in two Respects.

First, In regard to Children brought up at the Breast. And,

Secondly, In respect to those that are brought up by the Spoon, as 'tis vulgarly express'd.

First, As to such as are suckled from the Breast, the mistakes are not so many; however, some there are, as the giving the Child at the very first the Milk of a Woman that perhaps has been deliver'd six or seven Months before; which being, as Dr. *Harvey* well observes, of a Caseous kind, is stronger and more difficult in digestion, than is fitting for so tender and weak a Creature; which must produce a crude Chyle, and that by contaminating the Blood, lays the Foundation of many future Diseases: Besides which, you are sure to have the good Nurse with her Medicines, such as are before mention'd; never forgetting

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a little Sack to comfort it. In the mean time the Mother's Breasts are drawn by some notable old Woman, deprived both of her Senses and her Teeth, by which the poor Infant is defrauded of that only proper Food, which Nature, by the Providence and Direction of the Almighty himself, had been for some time treasuring up for it. But as I before said, the Child returning to its natural Food the Milk of the Mother, the mistakes cease, and so the poor Creature is preserv'd by Chance; and I am confident that the following Observation I here make is true, having made it my business to enquire into it; that of Infants which die, there are six to one of those that suck other Women, or are nursed without the Breast, to those that have the happiness of sucking their own Mothers.

And therefore in the second place let us make some short Observations on those Children which are brought up without the Breast. And here let us examine the most innocent Proceedings in the Case, in considering what is substituted in the stead of Milk for the common Food of Children. This generally is what our Women call Water-pap, as supposing that Bread and Water, of which it is compos'd, are the most weak, and consequently the most innocent, and fittest for the Nourishment of a new born Infant. Indeed they generally think it too weak; and therefore (with
great

great Prudence, as they think) add a little Wine, some hot Seeds, or the like.

To examine this first in general, we cannot say that this has any near resemblance to the Milk of the Breast; so that *Primâ facie* Nature is contradicted; but to go to Particulars, and consider the Composition it self, which is Water and Bread. The first being the most innocent, I shall say the least to; and yet I will venture to charge this with some faults. It is, comparatively speaking, of too cold and crude a Nature; for though by the heat of the Fire it be render'd actually hot, yet is it potentially and virtually cold; besides the great variety in Water it self, many kinds of which are not salubrious. The next is the Bread which is the other ingredient; and this is sufficiently faulty. The general sort that this Food is made up with, is the whitest Bread which Physicians call the filiginious and vulgarly nam'd fine Manchet. This is made with a great deal of strong Ale Yeast, with the addition sometimes of Soap, that for the Credit of the Baker it may swell and seem large; and as soon as it is risen in the Oven to its greatest Magnitude, immediately taken out; so that it has not that digestive heat it ought to have, in order to take off its crude fermenting Quality. With a great deal of this, and a little Water boil'd two or three hours together, our Mothers and Nurses make a thick *Pulmentum*, how fit for the Stomachs

of poor weak Infants, let any impartial Man consider and determine. And indeed too frequently we find the consequence agreeable to to this efficient; from hence arise those frothy, green, bilious, griping Stools, and often fatal *Diarrhæas*: From hence come Cholick pains, and other *Tormina* of the Ventricle and Intestines: And if it appear not in this manner, it is often discharg'd in those uneasy cutaneous Eruptions on the Face and other Parts. All these Mischiefs, and many more, owe their original entirely to these Errors first committed in the Food of Children; *Expertus Loquor*, and without Affectation or Vanity I can affirm that I have, by the blessing of God, recover'd several Children from the very Jaws of Death, by only regulating their Diet; and have always withdrawn the greatest Quantity, and sometimes all of that yeasty crude Bread, and only substituted in its room the Milk of a Cow that has but lately calved, if it could be obtain'd, diluted with a little Water being first boil'd, then mixing one part Water, and two parts Milk, and not boiling it together, but making it of the warmth of Breast Milk; and with this mean simple Diet, have I known several Children from being poor, weak, pale, emaciated Creatures, recover to a vivid, healthy, strong Habit: By which palpable Demonstration, I have brought over several from their Errors in the Food of their Children. This Diet, with making use of

of a little purging Medicine now and then, to supply the natural purging quality the Milk has at first in it, and a few Testaceous Powders prudently given, is the true method of bringing up Children without the Breast.

I am too sensible that there are many Objections, and those very reasonable, against Children sucking other Women than their Mothers; *viz.* the secret Diseases, Humours, Tempers, and the like, (which are used as Arguments for Children to be brought up at the Spoon, rather than run such hazards,) which are of dismal effect through the whole course of some poor Peoples Lives; of which there are very many instances: But all these agree to persuade every Mother, without the most evident Reason to the contrary, to be the Nurse of her own Children in Prudence, in Duty, in Nature, and in Conscience.

I shall mention but one thing more, and that is the risque Mothers run themselves, in regard to their own Health, when they thus appear Enemies to the conduct and guidance of Nature. It is generally resolved and determin'd before her Delivery, that the Mother is not to give suck to her Child, for Reasons not worth, or not fit to be mention'd: Upon this Resolution, soon after the Birth of the Child, the Breasts are cover'd with repellent Plaisters; then bathing with Spirits, and all other methods are used, to force the Milk, Nature had already separated, back again in-

to the Blood ; from whence arise many dangerous Diseases, though frequently attributed to other causes. For this ought to be known and attentively consider'd in the Animal Machine, that whatever Humours are once separated from the Blood by the secretory Offices of the Body, they are never admitted again into the Blood, but along with the Alimentary Juices, except by preternatural Force or Disease. This is evident in the Salive, the Bile, the pancreatick Juice, and the like, which pass not only the Offices of Digestion and Chylification, but all the Cribrations of the mesenterick Glands, and are afterwards diluted by the continual accession of Lymph poured into the *Ductus Chyliferi* by the Lymphaticks from all the Parts of the Body. Now what strange disorder must the return of such an Heterogeneous Liquor as the Milk back again into the Blood create, every one must be sensible, who can give any tolerable account of Nature ; and poor Women might be frequently convinced of it by sad experience, were they capable, or did they but seriously consider it. For to this imprudent management, I will be bold to affirm, are owing many troublesome, and sometimes fatal Diseases. To pass over those of lesser Note, such as frequent Abscesses, impostumated Milk-sores, painful Nodes, and the like ; from hence very often arise Pleurisies, Quinzies, intermitting and continued Fevers, attended with Horripilations,

ripilations, and the most violent Symptoms, frequently ending in Death it self: Here also are often laid the Foundations of incurable Cancers: Nay, 'tis the most common observation, that the going back of the Milk, as it is vulgarly express'd, is almost always attended with Aguish tremblings and a Fever. All which might have been prevented, and (humanly speaking) the lives of many, both Mothers and Children, preserved, by only following the common intendment of Nature; which ought to be indispensable, but upon the most manifest inability.

I will conclude this observation with an Experiment made by our late famous Dr. *Lower*, recorded in his excellent Book *de Corde*, *Cap. 2. pag. 115.* which when well weighed, will be very applicable to our present purpose. Tho' that great Man might perhaps have nothing else in view, than to prove the mechanical impediment of the Blood in its circulatory motion, by mixing with it abnormous and heterogeneous Liquors.

“ *Motus Cordis à sanguine alteratur, cum*
 “ *ab alieni mixtione, aut propriarum par-*
 “ *tium secessione, coagulatur & grumescit,*
 “ *adeo ut viam sibi ipsi & transitum om-*
 “ *nino præcludat; prout in peste, & veneno*
 “ *aliquando accidit; unde gravissima illa*
 “ *symptomata, Cordis sc. Anxietas, tremor,*
 “ *palpitatio, pulsus intermissio, & tandem*
 “ *syncope, & mors repentina succedant. Quæ*
 “ *omnia*

“ omnia in majore molosso, post injectam li-
 “ bram semis lactis recentis modicè cale-
 “ facti (experimenti gratiâ) in venam
 “ cruralem, detractâ priùs pari sanguinis
 “ copiâ, quo lacti recipiendo locus esset, (non
 “ sine magnâ commiseratione) semel vidi:
 “ Vix enim semihora elapsa est quin maximâ
 “ præcordiorum anxietate, & oppressione
 “ cordis, & diaphragmatis summâ con-
 “ tentione (pro expediendo sanguinis cir-
 “ cuitu) afficiebatur. Quin & mox crebrâ
 “ palpitatione, tremore, & gravissimis su-
 “ spiriis succedentibus, tandem inter mise-
 “ randos planctus & querelas, syncope ex-
 “ tinctus est. In dissecto, mox observavi
 “ venam cavam, utrosque cordis ventricu-
 “ los, vasa pulmonum atque aortam, lacte
 “ cum sanguine penitus concreto impleta, &
 “ adeo inter se compactus cum lacte sanguis
 “ fuit, ut digitis non ita facile divelli aut
 “ separari potuerit. Which for the sake of
 the tender Sex, who so often suffer on this ac-
 count, I shall render *verbatim* into as plain
English as I can.

The motion of the Heart is alter'd by the
 Blood it self, when either by the mixture of
 some Foreign Liquor, or by the separation of
 its own Parts it is curdled and clodded; so that
 it stops up its own way and passage, as it hap-
 pens sometimes in the Plague, and poisonous
 cases; from whence follow the most grievous
 Symptoms, heaviness, trembling, and palpi-
 tation

tation of the Heart, intermitting of the Pulse; at last fainting and sudden Death it self. All which I saw once tried in a large Mastiff, (not without a great deal of commiseration) upon injecting about half a Pint of new Milk made moderately warm (for the Experiments sake) into the crural Vein, having first taken away the like quantity of Blood to make room for the Milk. For scarce half an hour was pass'd, when he was taken with the greatest anxiety about the Breast, oppression of the Heart, the utmost struggling of the Midriff, in order to force the Blood into its circulation; presently succeeded frequent palpitation, trembling, the deepest sighs, and at last with miserable howlings and complaints fainted and died. Upon the Dissection of this poor Creature, I immediately found the great Vein, both the ventricles of the Heart, and the great Artery, all full of Blood and Milk curdled together, and so mix'd and compacted together were the Blood and Milk, that it was difficult to separate them, or pull them asunder, even with ones Fingers.

Here is an Experiment made by one of the greatest Physicians of the last Age, proving what horrid Effects are caused by the mixing of Milk with the Blood. I know what will be objected to this Experiment as here apply'd, (*viz.*) that the Milk was of a different Animal, the place of its admission quite different, besides the manner of its injection, the quantity and the

the like, which might produce those dismal Symptoms, and so suddenly. To which I answer, that in general it being prov'd, as it must for ever be, that the repelling of the Milk from the Breasts, and making it regurgitate into the Blood, is *Contra Naturam*, which I take to be an incontrovertible position, I say that the Experiment is justly applicable to the present case before us. I grant that it is very probable, that as the separation by the mamillary Glands is but *Guttatim*, or by little and little, so its being repell'd may be an Action proportionably as slow; but this only proves, that the Symptoms are not so suddenly aggravated, which in regard to consequence and practice, is so much the worse. Had the Symptoms in the recounted Experiment above, been as violent and instantaneous in Women, upon the repelling of their Milk back into the Blood; we had had the Practice long since condemn'd, and People deterr'd from such dangerous and unnatural attempts: But because the Effects are remote in respect to time, and many Persons do escape, (which is the best can be said of it) the Error is become Epidemical, and the true Cause, because not attended to, neglected and generally unknown.

There must, I am ready to acknowledge, be some exceptions and allowances; for giving suck may, in some Mothers, be impracticable, by some natural defect, as the want of the

Papilla

Papillæ or Nipples, and the like; in some others not only excusable, but even their Duty to avoid it; both for the sake of their own Healths and their Childrens; but instances of this kind are so few, in comparison to the other, whatever may be pretended, that there is not (I will venture to say) one to a thousand upon an impartial enquiry; yet is the practice to the contrary so universal, that one would think the Exception were the Rule and *vice versa*. And to this, as one great Reason, is owing the great difference in the number of Children, between Families of the lower Rank of Mankind, and those of the highest Stations. However, as this is intended for a Practical Essay, I shall set down for the use of such Mothers, who are reduced to so unhappy a necessity, what I have found by experience often repeated, the best method to prevent those ill Consequences, which so frequently ensue on the drying up of the Milk; which (besides the common method of Emplasters and the like, which by frequent practice are approved, and which I am not in the least about to condemn) is the frequent taking of testaceous Powders in some simple distilled Waters, which will preserve both the Milk and Blood in its Fluidity, and prevent its curdling, amongst which *Crabs eyes*, *Species à Chelis*, which is vulgarly call'd *Gascoin* Powder, burnt Hartshorn, Pearls, and the like; but the most preferable of all in this case, is Amber reduced to a most fine Powder,

Powder, which contains in it so dissolvent and balsamick a Quality, that I have frequently made use of it even in pluritick Pains, occasion'd by the forcing back the Milk, and hardly ever fail'd of success. This ought to be observ'd in the use of these Powders, that they be reduced to a most fine impalpable Powder, or they will be of small effect. For these kind of Medicines are in themselves indigestible, and so indeed they ought to be; for were they liable to undergo such alterations as alimentary Bodies, and most kind of other Medicines are, they would not be able to preserve their mild alkalious Nature, in which consists their true virtue, and by which they both prevent and dissolve all Coagulations.





The SYLLABUS to the FŒTUS.

a **T**HE Heart turn'd a little aside from its natural situation.

b The ascending *Aorta*.

c.c.c. The Thymick Arteries entring that Gland.

d.e.f.g.b. The Gland *Thymus* in its various Parts, not altogether in its natural Situation, but turn'd a little aside that its common Duct (*i.i.i.*) may be seen: And which is much more discernible in the *Fætus* of a Mare of the same Age; all the Globules and their Stalks by which they communicate with the Duct, being easily discover'd by the naked Eye in that Animal: And in the Months of *May* and *June* likeliest to be met withal.

d. That Portion of the *Thymus* contain'd within the Breast.

e. The *Isthmus* or continuation of the Gland.

f.f. The larger part just without the Breast.

g.g.g.g. Its two Processes running up on each side the *Aspera Arteria*.

b.b. The

b.b. The Place where the Branches of the *Thymus* communicate with the maxillar Glands.

i.i.i. The common Duct of the *Thymus*, which in a *Fætus* of four Months old of these Animals from the Coition, is cover'd by the *Parenchyma*, as are all its Globules, which yet by carefully removing its exterior Coats may be traced, but not so distinctly.

K.K. The maxillar Glands.

L.L. Several *Lymphæducts* passing from the Maxillars into the Root of the Tongue.

M. The Tongue.

N.N. Four openings of the salival Ducts that lie under the Tongue.

o.o. Two openings of the salival Ducts of the Cheeks, into which two Hogs Bristles *Q.Q.* are easily immitted.

P. The Thyroid Gland.

R.R.R. The forked Muscle call'd *Cricothyroideus*.

S.S. The *vena Umbilicalis* (with part of its *Capsulæ* or investing Membranes) entring the Liver.

T.T. The *Arteriæ Umbilicales* separated from the foresaid Veins, between which lies the Bladder *V.* the *Urachus* opening very apparently into the *Allantois*.

X. The

X. The Liver.

Y. Y. The Lungs.

Z. Z. The two Ventricles of the *Fætus* full of a mucilaginous transparent Liquor: That in the uppermost (*Z. I.*) being most limpid, and in no respect differing from what is discharg'd at the foresaid Ducts into the Mouth; that in the lowermost (*Z. 2.*) being a little more Turbid.

3. 3. The Intestines full even at this Age of a dark and almost black *meconium*.

4. 4. 4. 4. The Skin of this little Animal detracted and extended, in doing of which appear innumerable capillary Vessels, very worthy the Observations of the Curious.

5. 5. A Portion of the Diaphragm.

6. 6. The lower Jaws of the *Fætus* divided and extended.

F I N I S.



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